DOCUMENT RESUME

ED 230 740 CE 036 161

AUTHOR Gordon, Donald M.
TITLE Work Analysis Specialist Project. Final Report. Project Number 325-81-111-2.
INSTITUTION New Castle Community School Corp., Ind.
SPONS AGENCY Indiana State Board of Vocational and Technical Education, Indianapolis.
PUB DATE 1 Feb 83
NOTE 160p.
PUB TYPE Reports - Descriptive (141) -- reference Materials - Vocabularies/Classifications/Dictionaries (134)

EDRS PRICE MF01/PC07 Plus Postage.
DESCRIPTORS Competence; Competency Based Education; Demonstration Programs; *Economic Development; *Educational Needs; *Job Analysis; *Job Training; Needs Assessment; *Occupational Information; Postsecondary Education; Staff Development; *Task Analysis; Vocational Education
IDENTIFIERS Indiana (Henry County)

ABSTRACT

This project was conducted in New Castle (Henry County), Indiana to train and use the services of a work analysis specialist who would work with manufacturing companies to improve company profits through the provision of training programs based on a specific needs assessment. The determination of specific needs was accomplished through the application of a performance-based methodology known as Performance-Based Industrial Training/Training for Profit. In this method, a review was conducted of such factors as worker productivity, rework levels, tool breakage, quality control standards, and employee skill and training. As a result of the training and performance of the work analysis specialist, the following were outcomes for vocational education in Henry County: (1) work analysis services were provided to four Henry County companies and eight out-of-county companies, aiding the economic development of Indiana; (2) the vocational schools' performance-based curriculum was enhanced through sharing information developed by the project; (3) the value of having a work analysis specialist was demonstrated to the local community and to the state; and (4) good public relations were established. (A major portion of the document consists of task lists and task analysis guides developed for several corporations.) (KC)

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Final

FINAL REPORT

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WORK ANALYSIS SPECIALIST PROJECT

By: Donald M. Gordon

Project Number 325-81-111-2

New Castle Community School Corporation
New Castle, Indiana

February 1st, 1983

ED230740

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Project Population

Groups	Numbers of Persons: Impacted by project	Conducting or giving input
students		
secondary		
postsecondary		
adult		
school personnel		
secondary		6
postsecondary		5
adult		2
other		
teacher educators		1
employers	12	12
employees	834	49
other: _____		
special needs		
disadvantaged		
handicapped		
migrant		
minority		
limited English proficiency		
other: _____		

PROJECT STAFF

PROJECT DIRECTOR	Beverly Hankenhoff
WORK ANALYSIS SPECIALIST	Donald M. Gordon
PROJECT SECRETARY	Lana Pettus
STATE BOARD of VOCATIONAL and TECHNICAL EDUCATION and INDIANA PERFORMANCE TRAINING CENTER	Edgar E. Hornback
TRAINING SPECIALISTS, INCORPORATED	Nancy Evans
NEW CASTLE AREA VOCATIONAL SCHOOL STAFF	
ASSISTANT VOCATIONAL SCHOOL DIRECTOR	Ray Vulgan
CURRICULUM SPECIALIST	Carolyn N. Todd, CPS
WELDING COORDINATOR	Jan Conway
IVY TECH, REGION 8, INDIANAPOLIS	Ted Mackle
SMILEY'S BODY SHOP	Jeff Smiley

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IV. STATEMENT OF OBJECTIVES

Project Number 325-81-111-2 had as its objectives to:

(1) continue to train a work analysis specialist.

(2) complete four training programs from the 1980-81 Work Analysis Specialist Project.

(3) complete three additional training programs (local or state designated companies) based on the specific needs of the business or industry.

V. STATEMENT OF THE PROBLEM/PURPOSE

The purpose of this project was to train and use the services of a work analysis specialist who would work with manufacturing companies to improve company profits through the provision of training programs based on a specific needs assessment. The determination of specific needs was to be accomplished through the application of a performance based methodology known as Performance Based Industrial Training (PBIT)/Training for Profit (TfP). The PBIT/TfP method was to review such factors as worker productivity, re-work levels, tool breakage, quality control standards, employee skill and training, plus any other factor impacting on company profits and indicating training directions. The PBIT/TfP method would then be used to identify job titles, job tasks, and job task analysis. Job title information, task lists and task analysis guides assembled in training manual form would be an expected end product. Job title/task specific training could then be provided. Flexibility would be maintained since not all companies want or need all of the performance based items.

Henry County has to a very large extent depended on automotive and related industries for employment. The recession in this industry and in the state and national economies has led to closing of some companies and greatly reduced work forces for others, these companies having been significant employers of the county work force. The unemployment rate in Henry County has exceeded the state of Indiana unemployment rate, (average of 15.5% for last six months of 1982 calendar year), the latter rate being one of the highest rates of all the states.

Local government, financial institutions and business and industry are involved in an intensive effort to support existing business and industry and attract new and diversified business and industry. The state of Indiana is involved in a wide range of activities designed to develop the state's economic base. This local and state effort has begun to show results with new companies locating in Indiana including one new manufacturing firm in New Castle (MWA, Inc.), some companies expanding or moving in this direction, and still others taking a closer look at Indiana. All parties see

the availability of a large labor force as a key asset to economic development but also recognize the need for training and re-training of this labor force, both employed and unemployed persons.

The first year of the Work Analysis Specialist Project (1980-81), contributed to the economic development effort through the development of data bases for training and the provision of training programs for both local (Henry County) and non-local (Indiana) companies. The PBIT/TfP approach to labor force training was well received. A training needs assessment survey was also completed with all Henry County industries having input.

The economic development effort locally and statewide and its success and the success of the Work Analysis Specialist Project was seen as only the beginning of what needed to be an on-going effort for many years to come. This success also demonstrated what could be accomplished locally and throughout Indiana. The decision was made to continue the Work Analysis Specialist Project. This project was designed in accordance with the economic development thrust and would provide a work analysis and training service which would improve the capabilities of existing industry and help attract new industry. The results of the project would be the completion of four training programs from the first fiscal year project and three additional company specific training programs for local and/or non-local industries. The project would also enhance the NCAVS Performance Based Vocational Education program through sharing its contacts with business and industry and work analysis data. The benefits of having a Work Analysis Specialist would be demonstrated to the local community and the state.

VI. STRATEGIES AND PROCEDURES

Primary project personnel included the Project Director and the Work Analysis Specialist. The Project Director was responsible for fiscal operations and project management and seeing that reports were submitted to the State Board of Vocational and Technical Education. The Work Analysis Specialist was responsible for the completion of project objectives.

New Castle Area Vocational School staff, and staff of the Indiana Performance Training Center served as resource persons. The State Coordinator for Training and Economic Development served as a resource person, provided training through the Indiana Performance Training Center and established and monitored guidelines for TfP programs.

Objective #1: To continue to train a Work Analysis Specialist.

The following steps were taken to accomplish this objective:

1. The Specialist received instruction in the use of the TfP method with primary emphasis on changes made in the methodology and consistency of method application
2. The Specialist attended meetings at the Indiana Performance Training Center
3. The Specialist attended conferences and meetings the content of which centered in total or in part on industrial training

Objective #2: To complete four training programs from the 1980-81 Work Analysis Specialist Project

1. Performance Based data collection was completed and assembled in manual form for three of the training programs (one program per company); data included task limits, task analysis guides (elements, variables/limits, notes of explanation), tool and equipment lists and materials needed
2. A re-determination of training priorities was made
3. Workers to be trained were selected at two of the companies with discussion only at the third company
4. Instructors were hired for programs at two companies

5. Pre-testing and other screening of the workers to be trained was completed at two companies in the lab environment and/or in-plant using company work task content
6. The logistics of delivery were worked out
7. One training program known as level #1 welding was provided in the NCAVS welding lab using the content of company work tasks (the performance based data that was collected) for instruction and post-testing
8. One training program covering all welding performance levels needed at the second company was provided in-plant
9. Trainee attendance and performance in the training program was evaluated
10. Trainees at one company received certificates of completion from NCAVS and an attachment detailing the tasks the trainee successfully completed. A graduation luncheon was held for the trainees with participation of NCAVS and company personnel and both newspapers operating in Henry County
    NOTE: The second company steadfastly refused certificates
11. Data collection was completed for the third company. However, this company discontinued its interest in training at least for the near future, possibly due to massive lay-offs and other internal changes
12. The fourth decided to postpone task training but opted for training in "QUALITY CIRCLES" which was provided by the Indiana Performance Training Center
    NOTE: Other details are provided in this report under "Conclusions and Recommendations".

Objective #3: <u>To complete three additional training programs (local or state designated companies) based on the specific needs of the business or industry</u>

1. Performance based data collection was completed for four training programs (one program for each of the two companies which received welding training in objective #2, and one program each for two new state designated companies); data included task lists, task analysis guides (elements, variables/limits, notes of explanation), tool and equipment lists and materials needed

2. A determination of training priorities was made
3. Instructors were hired for the four training programs
4. Workers to be trained were selected with in-plant pre-testing and screening for skill levels at two of the companies using company work task content (the performance based data)
5. The logistics of delivery were worked out for three of the programs
6. A welding program known as level #2 was provided to one company (this company received level #1 welding under Objective #2 above)
7. A general orientation to welding equipment and materials, quality control, and company relevant terminology was provided to management of the second company with attendance by company personnel from other plant sites (this company received the program in general welding required in the plant under Objective #2 above)
8. A presentation of the TfP training manual for CNC Lathe and mill operator was jointly made by the Work Analysis Specialist Project and the Indiana Performance Training Center to the third company. Ivy Tech, Indianapolis, participated in the presentation meeting and contracted to provide instruction
9. Training for Hand Gun Operator and Shear/Carve Operator was provided to the fourth company
10. Trainee attendance and performance was evaluated
11. Certificates of completion were presented to one company which received welding training with the attachment detailing the tasks learned

NOTE: The second company which received welding training did not want the certificates

12. A fourth training program was provided to one of these companies (the company which received level #1 and level #2 welding instruction). GED instruction was provided to a large number of workers at the company by the Adult Continuing Education Division of NCAVS. Students included some of the trainees who participated in the welding instruction.

NOTE: Other details are provided in this report under "Conclusions and Recommendations".

VII. EVALUATION OF PROJECT

The Project Director and the State Coordinator for Training and Economic Development evaluated the activities and progress of the project through review of quarterly and other reports submitted by the Specialist and through regular meetings with and evaluation of the Specialist. Impact data was provided by industry personnel. Work Analysis Specialist meetings were held on an as needed basis. The Specialist submitted a weekly activities report to the State Coordinator for Training and Economic Development and to the Project Director.

TfP data base materials were critiqued by the Indiana Performance Training Center and other Work Analysis Specialists before submission to the company. Such critiques consisted of major emphasis on conformance to and consistency of application of TfP methodology. The company for which a given data base was developed critiqued the materials for content validity. Critique of other non-TfP materials was completed by the Project Director with input from other NCAVS staff.

VIII. CONCLUSIONS AND RECOMMENDATIONS

Conclusions:

1. Objective number 1 which was to continue to train a Work Analysis Specialist has been met in regards to using TfP methodology. Changes in definitions, tag writing rules, format for materials and other specifics applicable to the Specialist's work have been communicated.

2. Objective number 2 which was to complete four company specific training programs from the 1980-81 fiscal year was partially met. The training programs for Dana Corporation and Modernfold, Inc. were carried out and exceeded expectations. The program under study for Chrysler Corporation, New Castle, IN did not materialize due to lack of company participation possibly caused by major layoffs and changes in operations. However, most training materials were developed. Scottsburg Plastics, Scottsburg, IN decided to delay task analysis and task training.

3. Objective number 3 which was to complete three additional company specific training programs was met and exceeded. The project provided a second task training program for Dana Corporation, New Castle; provided a second welding program for Modernfold, Inc., Regal Rug, Inc., North Vernon, IN, trained employees using the task analysis data developed by the project as did Bowater Computer Forms in Scottsburg, Indiana. A needs assessment done in part by the project, led to a Quality Circles training program at Scottsburg Plastics, Scottsburg, Indiana.

4. The project was involved in data collection and other TfP areas with more companies than anticipated. A total of twelve companies received task analysis and/or other TfP services.

5. An important spin-off of the project was the enrollment of Dana workers in the NCAVS GED program, certainly a big event for these employees.

6. The project has enhanced the PBVE curriculum at the NCAVS through sharing company data (as authorized by the company) and sharing company contacts.

7. The companies which received formal training programs or completed their own training using project developed TfP data, as stated by them, have benefited through an increase in technical skills. The data collection and training also aided in the areas of employee morale, company awareness of training needs, and in some cases the manner in which operations are done in the plant.

8. The project has been well received by local and statewide business and industry as indicated by the number of companies participating. The value of having a Work Analysis Specialist is also indicated by this participation.

9. The project has made an important contribution to the economic development effort in Henry County and to the statewide effort through providing new skills and/or upgrading skills of employees through training and to some extent, through the TfP data collection process.

10. The Specialist participated in a NCAVS community resource survey. Although not included in the project objectives for the project year, this involvment helped establish rapport with business and industry necessary for project success and helped link the project with other community organizations.

Following is a list of activities by company which adds detail to the above conclusions:

Project activities by company

1. Bowater Computer Forms, Inc.- Scottsburg, Indiana

The project completed first drafts of 68 task analysis guides (tags) and assisted in the completion of an additional 25 tags. These guides were needed to train employees at Bowater's new plant in Scottsburg, Indiana. Interviewing was done at Bowater's Plano, Texas facility since the Scottsburg plant was under construction. Other projects and the Indiana Performance Training Center (IPTC) completed additional TfP work for the company. 35 employees were trained and an additional 150 employees were impacted by training. The Scottsburg plant is now in full operation. Job titles included: Maintenance Mechanic, Press Operator, Collator Operator, Utility Person, Lid Former, Shipper-Receiver, Lead Shipper.

2. Chrysler Corporation - New Castle, Indiana

The project completed a needs analysis and ten tags. This work was begun during the 80-81 project. Due to internal changes at the company, including major lay-offs, task analysis was discontinued. To the extent that work was completed, ten employees were impacted by this project's involvement. Tags were developed for the Finish Turn Operator job title.

3. Cybotech, Inc. - Indianapolis, Indiana

The project completed ten tags and assisted in developing an additional ten. Other projects and the IPTC provided additional TfP services. Thirty-five employees were trained and 60 impacted by training. Tag development was in the area of robot programming. Other projects and the IPTC are also providing services.

4. Dana Corporation, - New Castle, Indiana

The project completed two training programs in maintenance welding. Most of the tag development was completed during the 1980-81 project year. Instruction was provided by the NCAVS welding coordinator. Twenty-one maintenance welders were screened using performance based content (work specific to company). The level #1 training emphasized the content of 30 Dana welding tasks and was done in the NCAVS welding lab. Seven employees received 21 hours of training. The level #2 training which was done in-plant, concentrated on five Dana welding tasks with a higher difficulty level. It provided 18 hours of training to seven employees. An additional 18 employees were impacted by training. The NCAVS also provided GED training for some Dana workers.

5. Maul Technology, - Indiana Gear Works, - Indianapolis, Indiana

The project completed interviewing for two gear grind operations with the first draft of tags for one operation completed by the cut off data of this report (1-30-83) except for typing and some rewrite. Other projects and the IPTC are also providing services.

Job Title: Utility Worker

6. Mid West Abrasives, - New Castle, Indiana

The project completed a needs analysis and observation notes prerequisite to tag writing. This is a new plant having begun operations in July of 1982. Tags will be used to train new employees. It is anticipated that 15 employees will be trained and another 35 impacted by training.

7. Modernfold Corporation, Division of American Standard - New Castle, Indiana

The project completed two training programs in production in-process welding. The instruction was provided by a local expert and business person. The first training program, done in-plant, taught 20 Modernfold production welding tasks and demonstrated other welding processes. Fourteen workers received 20 hours of instruction. The second program, also done in-plant, provided five hours of intensive training to seven Modernfold management personnel from several plants. The instruction emphasized in-plant welding processes, welding equipment, safety, welding essentials, causes and cures of common welding problems, inspection and welding terminology. An additional 20 employees were impacted by training.

Job Titles: Fabricators, Mechanics

8. Parker Hannifin, Corporation, - Otsego, Michigan; Des Plaines, Illinois

The project completed 24 tags for the Otsego plant and first drafts of 19 tags for the Des Plaines plant. Training will be provided for 40 employees at the

company's Albion, Indiana operation, a facility now under construction. An additional 200 persons will be impacted by training. Other projects and the IPTC are also providing services.

Job Titles: Setup Operator, Mandrel Lathe Operator, Horizontal Hone Operator

9. Precision-Masters, Inc., - Indianapolis, Indiana

The project completed 56 tags (with interviewing help from another project) and assisted with an additional seven tags. All materials were completed. Training was arranged but not completed. The TfP work impacted on 12 employees. Note that employees showed some skill improvement due to having to provide data for training. Other projects and the IPTC also provided services.

Job Titles: 15 U Lathe, 10 VFS Mill Operator, 15 V Mill Operator

10. Regal Rug, Inc. - North Vernon, Indiana

The project completed 16 tags used to train employees for the company's new Form IiI division in North Vernon. A total of 24 persons have been trained and an additional 25 impacted by training.

Job Titles: Hand Gun Operator, Shear/Carve Operator

11. Scottsburg Plastics, Inc. - Scottsburg, Indiana

The project completed some follow up work from the 1980-81 project year. IPTC has provided other services including Quality Circles training. Twenty persons have been impacted by training. The Scottsburg plant has been in operation about 1½ years.

12. Wavetek, Inc. - Indianapolis, Indiana

The project completed 24 hours of observation and evaluation of the company's in-house training program for newly hired assembly workers. The project submitted an evaluation report to the company which recommended changes in the program. Training, as changed, will impact on 200 employees.

Recommendations:

1. The first two years of the Work Analysis Project have succeeded in gaining industry acceptance of the performance based approach to training as applied through the TfP method. Changes in method and technique have been made in response to the need to communicate more clearly with industry and the need to have an end product which is more complete in terms of content, structure, and application. It is recommended that the project increasingly reinforces performance based principles with the companies in forthcoming project years. The same princi-

ples and guidelines which have led to success in the past will help guarantee future success.

2. The acceptance by companies of the performance based approach to training is obviously an important product of the project's effort to work with companies. However, the acceptance is sometimes in principle only, rather than in practice. Some companies have followed through with performance training based on the data collected by the Specialist and are pleased with the results. In some cases companies ask for more data and training. Other companies to date have not used the data and show minimal interest in doing so, although anxious to participate in other services and support provided by the state. These services and support often make a critical difference when a company is making decisions and may be as important or more important than training at a given point in the company's history. However, in light of (1) the long term benefits of training, (2) the value of the TfP method for companies, and (3) the many hours spent on data collection and training materials preparation, it is recommended that the project continue its work toward getting the companies to do training using the data base developed by the Specialist. It is anticipated that all companies would be pleased with the results, and after the first performance training program, would show little if any reluctance. They will probably ask for more training. But the first step, like so many first steps, is the most difficult. Has the project been too reticient in encouraging this first step?

3. The training and orientation for new Work Analysis Specialists is critical to their success but more important to the success of the total effort being made by the local projects and the state to develop business and industry. The present training and orientation needs continued emphasis. Experience in using the TfP method and the performance based principles upon which the method is predicated is possibly the best teacher. However, allowing new Specialists to gain the benefits of this experience while at the same time producing a quality product is no easy task. This project is not suggesting solutions to the problems incumbent in this training/working arrangement for Specialists but rather recommends that as much attention be paid to the training and orientation needs of new Specialists and the training needs of experienced Specialists as is reasonable considering project demands and activities.

FINANCIAL STATEMENT FOR FINAL REPORT ENDING December 31, 1982
(Date)

Project No. 325-81-III-2

ITEMS	Project Budget FY 19--		Total Expenditures on Project		End of Project Balance	
	Agency	Federal	Agency	State/ Federal	Agency	State/ Federal
A. DIRECT EXPENDITURES						
1. Personnel	No local match required	28000.00		27947.04		52.96
2. Contractual services		5900.00		5731.72		168.28
3. Employee benefits		3638.00		3625.28		12.72
4. Travel		6400.00		4391.57		2008.43
5. Supplies and materials		1500.00		797.17		702.83
6. Communications (include phone, toll, printing)		500.00		528.08		(28.08)
7. Properties (rentals or purchase of equipment)		548.00		540.92		7.08
8. Facilities						
9. Product production and dissemination						
10. Project Evaluation						
B. INDIRECT EXPENDITURES						
C. TOTAL EXPENDITURES		46486.00		43561.78		2924.22*

Fiscal Agent/Director: Beverly Hankenhoff

Institution/Agency Name: New Castle Area Vocational School

*Refund this amount to the State Board of Vocational and Technical Education

Total Expenditures	43561.78
Total Receipts	37365.00
Balance Due	6196.78

DETAILED EXPENDITURES

DESCRIPTION		TOTAL EXPENDITURES
Work Analysis Specialist Salary		27947.04
Contracted Services		
Honorariums for Industry Instructors	2400.08	
Clerk/Typist	3331.64	5731.72
Fringe Benefits		
OASI, ISTR, PERF		3625.28
Travel		
Training Center, Conf. Travel	1217.10	
TfP Company Travel	3174.47	4391.57
Supplies		797.17
Communication		
Telephone (Long Distance)	125.87	
Postage	10.01	
Printing/Copies	392.20	528.08
Leased Equipment		540.92
Total Expenditures		$43561.78

X. APPENDICES

NOTE: A Complete Set of Materials Developed During the Project Year is Available on Site

Appendix A

A.1 Newspaper Publicity for Project Work with Dana Corporation

A.2 Dana In-House Paper Publicity

A.3 Project Article for Vocational Education Week Tabloid

A.4 Project Article for the Indiana Vocational Education "Communique"

Appendix B

B.1 Task Lists - Bowater Computer Forms

B.2 Task Analysis Guide - Bowater Computer Forms

B.3 Task List - Chrysler Corporation

B.4 Task Analysis Guide - Chrysler Corporation

B.5 Task Analysis Guide - Cybotech

B.6 Task List - Dana Corporation

B.7 Task Analysis Guide - Dana Corporation

B.8 Weld Performance Production Sheet - Dana Corporation

B.9 News Release Regarding Dana Training

B.10 21 Hour Training Report - Dana, In-Plant Training

B.11 30 Task Training Report - Dana, NCAVS Welding Lab Training

B.12 Task List - Modernfold Corporation

B.13 Task Analysis Guide - Modernfold Corporation

B.14 Training Program Synopsis - Modernfold, In-Plant Training

B.15 Training Program Task Priorities - Modernfold, In-Plant Training

B.16 Outline for Supervisor's Training Program - Modernfold, In-Plant Training

B.17 Instructor's Training Report Regarding Modernfold Training

B.18 Task List - Parker Hannifin, Corporation, Otsego, Michigan

B.19 Task Analysis Guide - Parker Hannifn, Otsego, Michigan

B.20 Task Lists - Parker Hannifin, Des Plaines, Illinois

B.21 Task Analysis Guides - Parker Hannifin, Des Plaines, Illinois

B.22 Task Lists - Precision-Masters

B.23 Task Analysis Guide - Precision-Masters

B.24 Task Lists - Regal Rug

B.25 Task Analysis Guide - Regal Rug

B.26 Evaluation Report - Wavetek Indiana, Inc.

Appendix
A-1.

Workers at Dana Graduate From An Innovative Training Program

5/10/82

By BETTY O'NEAL GIBONEY

As pioneers in one part of Indiana's industrial development plan, seven men, all maintenance employees of Dana Corp., have completed a course of study in welding techniques at New Castle Area Vocational School.

On Tuesday, following a luncheon at the school attended by the students and officials of both Dana and the vocational school, each student received a certificate of completion.

In the presentation, New Castle achieved a certain distinction. Of five vocational learning centers in Indiana involved in the "Performance-Based Industrial Training Program" sponsored by the State Board of Vocational and Technical Education to upgrade skills of those already employed, New Castle was the first to graduate a class. The other centers are located in Indianapolis, Kokomo, Lafayette and Terre Haute.

The course consisted of 21 hours of instruction on the workers' own time. Each of the evening sessions was approximately of three hours duration.

Dana Corp. was the first company in Henry County to take advantage of the training program, a cooperative effort of the public and private sectors. Dana plans another similar class as well as in-plant instruction as a follow-up to the first class. Another class is being planned with Modernfold. The school also will be working with Chrysler Corp. on job analysis.

The program here began taking shape in November 1980, when Don Gordon, work-analysis specialist with the NCAVS, began working with Craig Fowler, industrial relations manager, and Jack Pew, assisting maintenance manager, of Dana Corp. to establish the informational base for the proposed course and to develop the schedule for training.

The program was custom-made for Dana. Job titles as well as tasks to be performed under each job title were identified. Each task was analyzed to show the steps and order of activities to be completed. The knowledge and performance skill that each worker must have in order to complete the tasks were set down.

Work requirements were identified through interviews with experts and observation of tasks performed. After all information was assembled, it provided a performance-based job-training program

See WORKERS, Page 2

WORKERS

Continued From Page 1

that is considered measurable and cost-effective.

Before the first phase of training began, employees were pre-tested in order to match the specific training with the skills and needs of each worker.

Total cost of the program was shared by the State Board of Vocational and Technical Education, the New Castle Area Vocational School, Dana Corp. and the maintenance employees who participated in the program.

Students completed the course in December but Tuesday was the first time all students, representatives of Dana Corp. and the school could be gotten together.

Employees who received the certificates were Jack Pew, assistant maintenance manager who had helped design the course, and Gary Baughan, Keith Bean, John Bryson, Ray Johnson, John Stillwell and Ron Walcott.

Present for the luncheon besides the students, were John Wright, Dana plant manager; Craig Fowler, industrial relations manager; Beverly Hankenhoff, area vocational director of NCAVS; Don Gordon, work analysis specialist; Jan Conway, welding instructor for the program, and Brenda Leduc, secretary of New Castle Area Vocational School.

Each spoke briefly during the presentation ceremonies with Wright observing that the corporation was appreciative of the fact that the plant could avail itself of the vocational school and appreciated its employees who took time to improve their skills. It had been pointed out that purpose of the instruction was not to upgrade workers to other jobs, but to improve the skills needed on their present jobs.

Jan Conway, the instructor, later told how impressed he had been with the caliber of men who participated in the program.

"They were adults," he said. "They knew why they were there and used their time to a maximum. And they were appreciative." He also said that the students were interesting to him because of their inner motivation.

The luncheon had been prepared and served by students of the vocational food management lab of NCAVS, under the supervision of Viola Schuler, instructor.

Appendix A-2.

As Cast News

May 27, 1982

TO THE PEOPLE OF THE NEW CASTLE PLANT JOB SECURITY

It takes the efforts of all New Castle people every day to create job security. Do these words sound corny? If they do, it's unfortunate but I won't apologize for them. I believe sincerely the only job security we have is the security we make for ourselves.

What is job security? To many it is knowing they can provide their family with a decent living and not be worried every day that their plant may have to close for lack of business.

The way the people in the New Castle Plant perform their jobs is the major factor that influences job security. Producing a quality product at a competitive price determines whether or not we retain present business and get additional orders as they become available. Every individual in the New Castle Plant has a major bearing on the competitiveness of our operation. Anyone on the payroll is a cost. He or she must carry their own weight, pay their way, produce at or above standard. Those individuals that let the rest carry them are a threat to job security for all.

During this very serious "recession" the majority of the New Castle Plant people have acted responsibly. Production in all areas has been improved. Costs have been reduced allowing us to be more competitive for what business we have.

Your efforts have improved your job security. It will continue to take the efforts of all New Castle Plant people every day to maintain and improve that job security. We are still in a serious recession and we dare not have any setbacks that would allow our competitors to get any business we are capable of producing.

We must make our customers want to do business with us! We do that by producing and delivering a superior quality product at a competitive price.

I would like to invite any individual working in the New Castle Plant that does not believe or understand how he or she has a major bearing on the cost of our product and on the job security for all New Castle people to discuss it with your supervisor or to see me. Each of you has an opportunity to improve job security and each of you, regardless of your job assignment, performs a vital and important job. It will continue to take the effort of all people every day. With that effort we can and will move forward to gain more business for our plant and assure job security. The people of the New Castle Plant can do the job.

John Wright
Plant Manager

Welding class receives certificates — Pictured from left: Jan Conway (Instructor), Ron Walcott, Keith Bean, Ray Johnson, John Stillwell, John Bryson, Gary Baughan, Jack Pew, Don Gordon (New Castle Area Vocational School), Beverly Hankenhoff (New Castle Area Vocational School).

IRA AND PAYROLL DEDUCTIONS

In the Economic Recovery Act of 1981, as a great many of you already know, there is a provision for a person to set up an individual retirement account (IRA) beginning January 1, 1982.

An IRA is a personal tax-sheltered retirement savings plan which allows a worker to both reduce their current taxes and build more security for themselves and their families. An IRA will supplement your social security and pension plan.

There are different types of IRAs - one for wage earning individuals and spousal IRAs for married couples

Continued

Performance Studied in 2 Special Projects

Work Analysis Project Under Way

The New Castle Area Vocational School is operating a Work Analysis Specialist Project. Begun in September of 1980, this project is one of five projects in Indiana designed to analyze the work being done by the workers, provide worker training based on the work analysis, provide feedback on industry job requirements to vocational school programs,and to demonstrate the value of having a Work Analysis Specialist Project.

The NCAVS Work Analysis Specialist Project is working with industries both within and outside of Henry County and is a part of Henry County's and Indiana's intensive economic development effort.

The Work Analysis Specialist Project was prompted by the recognition of the high unemployment rates for Henry County and the state of Indiana, the fact that Henry County and Indiana have lost industries and jobs, and the awareness that both Henry County and the state need to improve the capabilities of existing industry and attract new industry. Both Henry County and the State of Indiana have a large labor pool available, and training and retraining of the labor force now appears essential to economic development.

Training programs provided by the Work Analysis Specialist Project are custom-made for industry workers. This custom-made quality is achieved through the use of a special data collection and training method known as Performance Based Industrial Training or Training for Profit. The PBIT-TFD method requires identification of the job titles at a company, the identification of the tasks to be performed under the job titles, the analysis of the work tasks showing the preferred steps and order of activities to be taken to complete each task and identification of the knowledge and performance skills the worker must have in order to complete the tasks.

These data are derived through interviewing company experts and observing the tasks being performed. The information is performance data, is limited to include only the work requirements at the selected work site, and when compiled, provides the data base for performance-based, job training that is measurable and cost-effective.

Donald Gordon, the Work Analysis Specialist, works with company personnel, analyzes the training need, develops the PBIT—TFP data and develops the training program content. Assistance and expertise in the work area being analyzed. Training may be provided by the vocational school or by an expert in a company or elsewhere.

Seven companies have received intensive services from the Work Analysis Specialist Project. Three of the companies are in Henry County. Four of the companies have been given high priority for training by the Indiana Department of Commerce.

Special Grant Funds The PBVE Project

New Castle Area Vocational School is one of the three model sites in Indiana for Performance-Based Vocational Education (PBVE) Curriculum. A grant for the program was awarded to NCAVS from the State Board of Vocational-Technical Education.

Other sites are Indiana Vocational Technical College, Region 8, Indianapolis, and Hammond Tech.

The New Castle site was the recipient of a U.S. Department of Education award of excellence in performance based programs in DOE Region 3 competition in 1981

The goals of PBVE are to minimize the weaknesses of the program, to build on strengths to make goals and objectives more precise, to design better programs and materials, and to strive for greater objectivity and accountability.

Under the PBVE program a student's course content is divided into three parts — attitudes, mental and physical behavior. Each student is given a performance objective and told in precise, measurable terms what behavior or skills he must demonstrate under specified conditions in order to achieve the objective.

After much research, the PBVE curriculum was written to include a list of job titles and a list of the skills needed to perform the jobs. The skills are analyzed, and standards are set for the acceptable performance of skill. Performance is regularly tested.

The curriculum can be adjusted for large or small groups of students, and for individual instruction.

At the New Castle Area Vocational School, students are required to meet competency requirements in the following areas: communications, human relations, job-seeking skills, first aid, and rules and regulations of the school.

At present, a PBVE curriculum has not been fully developed for each of the programs at the school. Health Occupations, for example, has a fully developed curriculum that includes evaluation of skills performance. For some programs, like Welding, Machine Shop and Food Management, the PBVE programs still are being written.

Students succeed in their training by meeting requirements based on standards of industry. At the end of a training period, students are given certificates and lists of the skills they have mastered.

A student who has mastered all the required tasks in his area of study at the vocational school may begin to study at a post-secondary school while he still is enrolled at NCAVS.

The New Castle PBVE Curriculum office welcomes visitors wishing to learn more about performance based vocational education. Carolyn Todd, director of PBVE Curriculum, can be reached at 529-3503.

Appendix A-3.

YETP Offers Youth On-the-Job Training

Hundreds of New Castle Area Vocational School students have participated in the Youth Employment

County Surveyor's Office and the Raintree Activity Center, to name only a few of the sites cooperating in the training

of its kind in Indiana. At present, approximately 60 students participate, but in

increases dramatically as a result of the provisions of the program.

dards are changed (i.e., manufacturers change specifications) the transition is smooth because specifications within modules may be substituted.

Teachers are responsible for

Two other instructors, from Business Education and Medical Assistance, described more advantages for the teacher and student.

For example, when a program is adopted at both the post and

formance - based system is not a cure-all. It requires a commitment by teachers and administrators and it doesn't work equally well in all fields. But so far those who have used it are convinced it is worth the extra investment.

Work analysis specialist project

Transforming Indiana's large labor pool into a desirable labor market is a goal of the Work Analysis Specialist Project; five projects now exist. The New Castle Vocational Area School operates one of them, working with industries in and out of Henry County. Performance-based methodology dominates the training procedure.

Both Performance-Based Industrial Training (PBIT) and Training for Profit (TFP) are available to Hoosier industry, according to Donald Gordon, work analysis specialist for New Castle Area Vocational Schools. Industry that wants to increase production standards, implement new technology or begin manufacturing contacts a designated center, asking for training assistance.

The first thing that the specialist does is establish contact with the company's management. How is the job currently being done? is this an effective method? have other methods been used? are the types of questions the specialist must ask. This orientation leads to identification of the tasks, their component skills, and company standardized requirements. These performance data are the basis of what have been called "custom-made training programs."

Most employees affected by PBIT increase their performance standards for a skill in which they already have some training. Others, who have been laid off or, who are in a depressed industry (for example, automobile) may take advantage of being retrained at either an area school or the company, depending on parameters set by the industry.

These programs appear to be essential to economic development in Indiana. Donald Gordon, NCAVS work analysis specialist, states that the performance - based programs are attractive to both industry and personnel. The company receives subsidized, made-to-order training for its employees, making their operation more efficient and therefore more competitive. Employees have the opportunity to improve their skills while still working.

People who have been laid off or who are a depressed industry, are attracted to the system because they realize that desirable jobs aren't available without retraining. Consequently, vocational education is perceived as important.

Gordon suggests that the relationship between the labor pool and industry could be strengthened if educators speculated on the demand for certain skills and then offered appropriate performance-based programs.

As directions of Indiana business become less vague, and as more and more jobs undergo performance data evaluation, vocational educators can expect to make more and more contributions to a valuable labor market.

Appendix B-1.

March 1982

Bowater Computer Forms, Inc.

ITEM: TASKS by GROUPS

JOB TITLE: MAINTENANCE MECHANIC

	1.0	GROUP: ADJUST EQUIPMENT PARTS ON HAMILTON PRESS
TASKS:	1.1	Adjust dampening system on Hamilton press
	1.2	Adjust bare form pressure on press
	1.3	Adjust ink ductor roller on Hamilton press litho tower
	1.4	Adjust controls for front, back and side leans on Hamilton press
	1.5	Set form rollers on Hamilton press
	1.6	Free press gears on Hamilton press
	1.7	Adjust gripper wheels on Hamilton press
	1.8	Adjust pull rolls on Hamilton press
	1.9	Adjust foldover on Hamilton press
	2.0	GROUP: REMOVE and REPLACE EQUIPMENT PARTS ON HAMILTON PRESS
TASKS:	2.1	Replace light in button on Hamilton press
	2.2	Replace bearings on rewinder shave on Hamilton press
	2.3	Remove and replace die ring on Hamilton press
	2.4	Remove and replace punch ring on Hamilton press
	2.5	Change gripper pads on Hamilton press
	2.6	Replace tucker blades on Hamilton press
	3.0	GROUP: LUBRICATE/CLEAN HAMILTON PRESS EQUIPMENT
TASKS:	3.1	Clean spray marker on Hamilton press
	3.2	Lubricate the Hamilton press
	4.0	GROUP: HAMILTON PRESS TROUBLE SHOOTING
TASKS:	4.1	Trouble shoot the printing tower on the Hamilton press
	4.2	Correct relays on Hamilton press

Maintenance Mechanic Tasks Cont.

5.0 GROUP: ADJUST EQUIPMENT PARTS ON COLLATOR

TASKS:
- 5.1 Adjust unwinder brakes on collator
- 5.2 Adjust for front, back or side leans on collator
- 5.3 Adjust gripper wheels on collator
- 5.4 Adjust pull rolls on collator

6.0 GROUP: COLLATOR TROUBLE SHOOTING

TASKS:
- 6.1 Correct relays on collator

7.0 GROUP: REMOVE and REPLACE EQUIPMENT PARTS ON COLLATOR

TASKS:
- 7.1 Replace light in button on collator
- 7.2 Replace broken pin band on collator

8.0 GROUP: LUBRICATE/CLEAN COLLATOR

TASKS:
- 8.1 Clean spray marker on collator
- 8.2 Lubricate collator equipment

9.0 GROUP: HAMILTON PRESS MISCELLANEOUS

TASKS:
- 9.1 Complete 1000 hour routine service on air compressor

March 1982

Bowater Computer Forms, Inc.

ITEM: TASKS by GROUPS

JOB TITLE: HAMILTON PRESS OPERATOR

1.0 GROUP: PRESS SET-UP

TASKS:
- 1.1 Web the Hamilton press
- 1.2 "Make Ready" for production run on Hamilton press

2.0 GROUP: CHECK EQUIPMENT/MATERIALS ON HAMILTON PRESS

TASKS:
- 2.1 Check ink quality on Hamilton press
- 2.2 Check box condition
- 2.3 Check punches in computer paper run on Hamilton press
- 2.4 Check cross perforation of computer paper run on Hamilton press
- 2.5 Check marginal perforations of computer paper run on Hamilton press

3.0 GROUP: CHANGE EQUIPMENT PARTS/MATERIALS ON HAMILTON PRESS

TASKS:
- 3.1 Change ink form roller on Hamilton press
- 3.2 Change air tube on folder
- 3.3 Change die on Hamilton press
- 3.4 Change blanket on Hamilton press
- 3.5 Change punch on Hamilton press
- 3.6 Change ink color on Hamilton press
- 3.7 Change idler roller wrap on Hamilton press
- 3.8 Change the plate on the Hamilton press
- 3.9 Change perforation blades on Hamilton press
- 3.10 Set the timing on the folder of the Hamilton press

4.0 GROUP: MANUFACTURE PRODUCT ON HAMILTON PRESS

TASKS:
- 4.1 Run computer form on Hamilton press
- 4.2 Box computer paper run on Hamilton press
- 4.3 Label box for product run on Hamilton press
- 4.4 Number box for product run on Hamilton press

Press Operator Tasks Cont.

5.0 GROUP: HAMILTON PRESS MISCELLANEOUS

TASKS: 5.1 Complete routine housekeeping at Hamilton press area

Bowater Computer Forms, Inc.

ITEM: TASKS by GROUPS

JOB TITLE: COLLATOR OPERATOR

1.0 GROUP: COLLATOR SET-UP

TASKS:
- 1.1 Load carbon roll on collator
- 1.2 Load paper roll on collator
- 1.3 Web carbon paper on collator
- 1.4 Web computer paper on collator
- 1.5 Splice paper roll on collator

2.0 GROUP: QUALITY CONTROL CHECKS

TASKS:
- 2.1 Complete periodic inspection of manufactured paper to be used on collator
- 2.2 Check print quality of manufactured paper to be used on collator
- 2.3 Check cross perforation quality of computer form run on collator

3.0 GROUP: CHANGE EQUIPMENT PARTS ON COLLATOR

TASKS:
- 3.1 Change crimps on collator
- 3.2 Change perforation blade on collator
- 3.3 Change head on collator

4.0 GROUP: ADJUST EQUIPMENT PARTS ON COLLATOR

TASKS:
- 4.1 Adjust spiral folder on collator
- 4.2 Adjust folder on collator
- 4.3 Adjust crimp unit on collator
- 4.4 Adjust cross perforation blade on collator

5.0 GROUP: MANUFACTURE PRODUCT ON COLLATOR

TASKS:
- 5.1 Operate collator to produce multi-part computer form
- 5.2 Box finished product run on collator

TASK ANALYSIS GUIDE

I.D. NO. 3.3

Appendix B-2.

Bowater, Collator Operator

1. Task Statement:

Change head on collator

11. Task Performance Cues:

Required by product to be run on collator

111. Task Performance Procedures:

A. When a decision must be made, indicate alternatives as "Yes-No" answers to questions.

B. List performance steps by most frequently occuring sequence.

TASK ELEMENTS	Decisions		Go To Step	Tools, References, Work Aids
	Yes	No		
1. Observe safety.			2	
2. Turn off the collator.			3	
3. Unplug the heating unit.			4	
Pull the hose off the head.			5	
5. Move to the gear side of the collator.			6	
6. Remove gears to gain access to the head.			7	
7. Remove the four bolts.			8	
8. Lift out the head.			9	
9. Lift out the crimp unit.			10	
10. Set in the replacement head.			11	
11. Set in the replacement crimp unit.			12	
. Put bolts back in.			13	
13. Plug in hose.			14	

TASK ELEMENTS	Decisions		Go To Step	Tools, References, Work Aids
	Yes	No		
14. Plug in heating unit.			15	
15. Have all parts been assembled properly?	16	21		
16. Replace gears.			17	
17. Set up folder.			18	
18. Turn on collator.			19	
19. Run product sample.			20	
20. Does sample meet specifications?	EOT	22		
21. Adjust parts to requirements.			16	
22. See foreman for assistance.			EOT	

TASK LIMITS

TASK I.D. and STATEMENT: Change head on collator

Limit# 1, Safety

Variables:
1. Turn off machine by pressing stop button
2. Caution around rollers
3. Caution around gears
4. Weight of head

Limit# 2, Hoses

Variables:
1. 2 hoses
2. Type _____
3. Size _____

Limit# 3, Gears

Variables:
1. Two removed
2. One moved out of the way
3. Type _____

Limit# 4, Head Size

Variables:
1. See specifications
2. 8 1/2" or 11" head

Limit# 5, Bolts

Variables:
1. Type _____, Size _____

Limit# 6, Tools

Variables:
1. Screw driver type _____, size _____
2. Wrench type _____ size _____

Limit# 7, Equipment

Variables:
1. Hoist

Limit# , _____

Variables:

Limit# , _____

Variables:

TASK ANALYSIS GUIDE

I.D. NO. 3.4

Bowater, Press Operator

1. **Task Statement:**

Change blanket on Hamilton press

11. **Task Performance Cues:**

Blanket is worn

111. **Task Performance Procedures:**

A. When a decision must be made, indicate alternatives as "Yes-No" answers to questions.

B. List performance steps by most frequently occuring sequence.

TASK ELEMENTS	Decisions		Go To Step	Tools, References, Work Aids
	Yes	No		
1. Observe safety.			2	
2. Clean the blanket now on the press.			3	
3. Gum the plate.			4	
Back off on the impression.			5	
5. Loosen the set screws.			6	
6. Back off the sockets to ease out the blanket.			7	
7. Remove the blanket.			8	
8. Clean the blanket cylinder.			9	
9. Wrap the new blanket around the cylinder.			10	
10. Put the ends of the blanket in the gap in the cylinder.			11	
11. Are there bubbles in the blanket?	12	13		
12. Work out the bubbles and make sides of the blanket even and firm.			13	
13. Tighten both sockets to pull in blanket.			14	

3.4 Cont.

TASK ELEMENTS	Decisions		Go To Step	Tools, References, Work Aids
	Yes	No		
14. Remove additional bubbles.			15	
15. Is blanket tight?	16	21		
16. Tighten the set screws.			17	
17. Clean the blanket again.			18	
18. Start the press at a slow run.			19	
19. Set the impression.			20	
20. Adjust the impression until the print is good.			EOT	TAG-Press Operator 2.1
21. Adjust sockets to tighten blanket.			16	

TASK LIMITS

TASK I.D. and STATEMENT: Change blanket on Hamilton press

Limit# 1, Safety

Variables:
1. Turn off machine using stop button
2. Caution around rollers
3. Caution around gears

Limit# 2, Cleaning Blanket

Variables:
1. Use blanket wash

Limit# 3, Gum the Plate

Variables:
1. Use plate preservative (white gel) called _____

Limit# 4, Adjusting the Impression

Variables:
1. Turn impression handle
2. Use impression dial with 0-14 setting points

Limit# 5, Screws

Variables:
1. Allen, sizes _____

Limit# 6, The Gap

Variables:
1. Opening in cylinder
2. Two bars in gap
3. Hold ends of blanket

Limit# 7, Eliminating Bubble Blanket

Variables:
1. Critical to task
2. Remove manually
3. Begin at one end and work to the other end or work from middle out

Limit# 8, Cleaning Cylinder

Variables:
1. Use _____

Limit# 9, Sockets

Variables:
1. Two in number
2. Type _____, Size ___

TASK LIMITS

TASK I.D. and STATEMENT: Change blanket on Hamilton press (Cont.)

Limit# 10, Blanket Tension	Limit# 11, Tools	Limit# 12, Print Quality
Variables:	Variables:	Variables:
1. Manual test by: _____	1. Allen wrench size _____	1. Coverage
	2. _____ (to adjust sockets)	2. Even print
		3. Dot structure
		4. Blotches
		5. Centered
		6. Lightness, darkness
		7. Fading

Limit# , _____	Limit# , _____	Limit# , _____
Variables:	Variables:	Variables:

Limit# , _____	Limit# , _____	Limit# , _____
Variables:	Variables:	Variables:

TASK ANALYSIS GUIDE

I.D. NO. 2.3

Bowater, Maintenance Mechanic

1. **Task Statement:**

Remove and replace die ring on Hamilton press

11. **Task Performance Cues:**

Line hole punches do not meet standards; Instruction from supervisor

111. **Task Performance Procedures:**

A. When a decision must be made, indicate alternatives as "Yes-No" answers to questions.

B. List performance steps by most frequently occuring sequence.

TASK ELEMENTS	Decisions		Go To Step	Tools, References, Work Aids
	Yes	No		
1. Observe safety.			2	
2. Remove the punch directly above the die ring to be removed.			3	TAG-Maintenance Mechanic, 2.4
3. Inch the press around to expose the set screw on the die ring.			4	
4. Stop the press.			5	
5. Loosen the set screw.			6	
6. Rotate the die ring back 180 degrees.			7	
7. Loosen the stop bolt.			8	
8. Remove the two die ring collator bolts.			9	
9. Slide the die ring collar over.			10	
10. Remove the bolts that hold the two halves of the die ring collar together.			11	
11. Remove the bottom half of the collar.			12	
12. Remove the top half of the collar.			13	

2.3 Cont.

TASK ELEMENTS	Decisions		Go To Step	Tools, References, Work Aids
	Yes	No		
13. Is the shaft free of nicks?	14	24		
14. Put on the new top half of the die ring collar.			15	
15. Put on the new bottom half of the die ring collar.			16	
16. Replace the bolts that hold the collar together.			17	
17. Return the new collar to proper position.			18	
18. Replace the collar bolts.			19	
19. Tighten the stop bolt.			20	
20. Rotate the die ring forward 180 degrees.			21	
21. Tighten the set screw.			22	
22. Operate the press.			23	TAG-Press Operator 4.1
23. Are line hole punches up to standards?	EOT	25		
24. See supervisor for instructions.			EOT	
25. Check the work and see the supervisor.			EOT	

TASK LIMITS

TASK I.D. and STATEMENT: Remove and replace die ring on Hamilton press

Limit# 1, Safety

Variables:
1. Turn off machine
2. Depress stop button
3. Weight of collar halves
4. Support of collar halves
5. Caution around rollers
6. Caution around bearings

Limit# 2, Tools

Variables:
1. Plastic head hammer
2. Screw driver size ___, type _____
3. Wrench size ____, type ____

Limit# 3, Inch Press

Variables:
1. Use inch button

Limit# 4, Screws

Variables:
1. Type ____, size ____

Limit# 5, Bolts

Variables:
1. Type ____, size ____

Limit# 6, Die Ring I.D.

Variables:
1. Part # _____

Limit# 7, Line Hole Punch Inspection

Variables:
1. Look for: clean punches, no hanging punches, punches properly located

Limit# , _____

Variables:

Limit# , _____

Variables:

Appendix B-3.

CHRYSLER CORPORATION, NEW CASTLE

Dept. 95 - Finish Turn Operator

TASKS by DOMAINS

A. DOMAIN: Machining

Task: A-1. Machine (finish turn) front wheel drive hubs on Werth lathes.

B. DOMAIN: Gauging

Task: B-1. Gauge wheel hub from back of flange to bearing end.
B-2. Gauge wheel hub bearing height to back of flange.
B-3. Gauge wheel hub for wheel and rotor diameter.
B-4. Gauge wheel hub for flange thickness.

C. DOMAIN: Tooling, Carbide Inserts

Task: C-1. Inspect carbide insert cutting tip.
C-2. Index carbide insert locating at usable cutting tip.
C-3. Remove and replace carbide insert.

D. DOMAIN: Tooling, Adjusting to Specifications

Task: D-1. Adjust bottom tool for wheel hub flange thickness dimension.
D-2. Adjust bottom tool for hub wheel and rotor diameter dimensions.
D-3. Adjust top tool for hub bearing diameter dimensions.
D-4. Adjust top tool for wheel hub shoulder height dimension.

Appendix B-4.

TASK ANALYSIS GUIDE

~~Appendix C-4~~ 1 of 27 pages

I.D. NO. A-1

Task Analysis Guides and Task Limits

1. Task Statement:

Machine (finish turn) front wheel drive hubs on Werthe lathes

11. Task Performance Cues:

Instruction from department 95 supervision

111. Task Performance Procedures:

A. When a decision must be made, indicate alternatives as "Yes-No" answers to questions.

B. List performance steps by most frequently occuring sequence.

TASK ELEMENTS	Decisions		Go To Step	Tools, References, Work Aids
	Yes	No		
1. Observe safety regulations.			2	
2. Are lathes turned on?	3	41		
3. Are there damaged carbide inserts?	4	6		T.A.G. C-1
4. Remove and replace or index carbide inserts.			5	T.A.G. C-2, C-3 D-3, D-4
5. Adjust tooling.			6	T.A.G. D-1, D-2
6. Position yourself at first lathe.			7	
7. ick up wheel hub.			8	
8. Inspect hub.			9	
9. Does hub pass inspection?	10	42		
10. Load hub on spindle.			11	
11. Clamp hub on spindle.			12	
12. Does hub clamp tightly?	13	43		
13. Pick up another hub.			14	
14. Repeat steps 8,9,10,11 above loading second spindle.			15	
15. Does hub clamp tightly?	16	43		
16. Repeat steps 8,9,10,11 above to load third spindle.			17	
17. Does hub clamp tightly?	18	43		
18. Repeat steps to load fourth spindle.			19	
19. Does hub clamp tightly?	20	43		
20. Close the sliding door.			21	
21. Start machining cycle.			22	
22. ove to the second lathe.			23	
23. Repeat steps 8,9,10,11, ng all spindles.			24	
24. ose the sliding door.			25	
25. Start the machining cycle.			26	
26. Return to first lathe.			27	

TASK ELEMENTS	Decisions		Go To Step	Tools, References, Work Aids
	Yes	No		
27. Is sliding door open?	28	44		
28. Remove hubs from spindles.			29	
29. Do hubs need gauging?	30	32		
30. Gauge all hubs.			31	T.A.G. B-1, B-2, B-3, B-4,
31. Did hubs gauge within specifications?	32	45		
32. Hang hubs on monorail.			33	
33. Clean shavings from tooling.			34	
34. Repeat steps to load, machine & unload hubs.			35	
35. Return to second lathe.			36	
36. Repeat steps to load, machine & unload hubs.			37	
37. Finish production quota.			38	
38. Turn lathes off.			39	
39. Clean out lathes.			40	
40. Clean-up work area.			E.O.T.	
41. Turn on lathes.			3	
42. Put hub in salvage bin.			7	
43. Call set-up person.			E.O.T.	
44. Wait until door opens automatically.			28	
45. Put out of gauge hubs in salvage bin.			46	
46. Do inserts need indexing or replacing?	47	48		T.A.G. C-1
47. Index or replace inserts.			48	T.A.G. C-2, C-3
48. Adjust tooling.			37	T.A.G. D-1, D-2, D-3

TASK LIMITS

A-1. Machine (finish turn) front wheel drive wheel hubs on Werth lathes.

1. Work Orders

Variables: Verbal

2. Equipment

Variables: Werth lathes (slant bed, four spindle, cam operated)
Metal track for park monorail
Salvage bin
Gauge bin
Cycle counter
Parts counter
Air hose
Short handled rake

3. Protective Gear

Variables: Safety glasses
Cotton work gloves
Ear plugs(optional)

4. Equipment Set-up

Variables: Main disconnect on button
Auto buttons on light
Off button

5. Insert inspection

Variables: Cracks, Chips, Rough edges, corners, Wear

6. Hand tools

Variables: 7/32" allen wrench
5/8" crescent wrench

7. Insert Numbers

Variables:

8. Machining classifications

Variables: Spline
Clean-ups
This flange

9. Tooling

Variables: Spindle #'s 1,2,3,4,
Collets (4)
Top tool block
Bottom tool block

10. Wheel Hub Parts

Variables: Bearing
Flange
Wheel diameter
Rotor diameter

11. Positioning

Variables: Dead stop

12. Control Panel

Variables:

13. Machine Parts

Variables: Control panel
Sliding door
Housing

14. Gauge I.D. #

Variables:

15. Gauging Sequence

Variables:

TASK LIMITS

A-1 Cont.

16. Gauge Tolerences

Variables:

17. Gauge Care

Variables: Wipe off
No abuse

18. Tool Efficiency

Variables: Cleaning (shavings)
Shaving removal
Safety

19. Production Standard

Variables: # of cycles
# of parts

20. Housekeeping

Variables: Machine - cleaning
work area - tool
return, gauge return,
Parts picked up
Shavings picked up

TASK ANALYSIS GUIDE

I.D. NO. _____

Appendix B-5.

1. Task Statement:

Record INITIALIZATION trajectory and HOME position

II. Task Performance Cues:

Instruction from supervisor /Robot programming requires this task

III. Task Performance Procedures:

A. When a decision must be made, indicate alternatives as "Yes-No" answers to questions.

B. List performance steps by most frequently occuring sequence.

TASK ELEMENTS	Decisions		Go To Step	Tools, References, Work Aids
	Yes	No		
1. Observe safety rules.			2	
2. Use hand control to align Robot to six (6) degrees of freedom.			3	
3. Push TEACH INITIALIZATION TRAJECTRY button on controller.			4	
4. Press CREATE POINT on hand control.			5	
5. Read display point one and using hand control, rotate axis #1 until the number "1" appears as INITIALIZATION ZONE.			6	
6. Continue to rotate axis #1 in same direction until the number "1" appears after the word INITIALIZATION ZONE and AXIS INITIALIZED on display screen.			7	
7. Continue to rotate axis #1 in same direction until the number "1" only appears by AXIS INITIALIZED on display screen.			8	
8. Press CREATE POINT.			9	
9. Repeat steps 3 thru 8 above to program axis 2,3,4, 5, and 6.			10	

TASK ELEMENTS	Decisions		Go To Step	Tools, References, Work Aids
	Yes	No		
10. Remove Robot with hand control and align to reference position (cf. arrows)			11	
11. Press CREATE POINT.			12	
12. Read display screen POINT # 8.			13	
13. Press MENU.			14	
14. Press END OF TEACH.			15	
15. Press RECORD HOME position.			16	
16. Press MEMORIZE HOME position.			17	
17. Use hand control and move Robot back to reference marks.			18	
18. Press EXECUTE INIT. TRAJECTRY.			19	
19. Press START CYCLE.			20	
20. Push HOME position.			21	
21. Does Robot program need editing?	22	EOT		
22. Edit program.			19	See T.A.G. for editing.

Appendix B-6 1 of 3 pages

MAINTENANCE WELDING TASKS SELECTED for DANA TRAINING

(Selected from task/domain inventory)

Maintenance Welding Tasks Selected for Training

A-1. Shielded metal arc weld (S.M.A.W.) "T" joint on cast iron

A-2. S.M.A.W. butt joint on cast iron

A-3. S.M.A.W. inside corner joint on cast iron

A-4. S.M.A.W. lap joint to fill in hole on cast iron

A-5. Shielded metal arc scarf on cast iron

B-1. S.M.A.W. to repair sand pipe using butt joint

B-2. S.M.A.W. rings to pipe using fillet weld

B-5. S.M.A.W. to repair crack in pressure pipe using fillet weld

B-7. S.M.A.W. pipe and angle iron to fabricate railing

C-6. S.M.A.W. light gauge metal using corner weld to fabricate guard for belt on machinery

D-1. S.M.A.W. aluminum using flat weld to patch mold machine pattern

D-2. S.M.A.W. aluminum band for core machine using V'd out butt joint

E-1. S.M.A.W. mild steel machinery to repair shaft using stitch weld pattern

E-4. S.M.A.W. mild steel furnace lid to repair

E-16. S.M.A.W. mild steel overhead tracks to repair worn area

SELECTED WELDING TASKS CONT.

F-1. S.M.A.W. mild steel using butt joint

F-2. S.M.A.W. mild steel using lap joint

F-3. S.M.A.W. mild steel using inside corner joint

F-4. S.M.A.W. mild steel using "T" joint

F-5. S.M.A.W. mild steel using vertical upweld corner joint

F-7. S.M.A.W. mild steel to salvage skimmer

F-18. S.M.A.W. mild steel using overhead weld

G-2. S.M.A.W. manganese to patch fixture for wheelabrator

I-1. S.M.A.W. perforated steel to fabricate cat-walk

M-1. Oxyacetylene weld mild steel to fabricate belt guard for machinery

N-3. Oxyacetylene cut hard steel bearing race off shaft

W-7. Silver solder using oxyacetylene torch to repair copper coil on furnace

X-1. Test and inspect the weld

SELECTED WELDING TASKS CONT.

Y-1. Use protective equipment and gear for arc welding

Y-2. Use protective equipment and gear for oxyacetylene welding

TASK ANALYSIS GUIDE

Appendix B-7.

I.D. NO. E-16

.. Task Statement:

Shielded Metal Arc Weld (S.M.A.W.) mild steel overhead tracks to repair worn area

11. Task Performance Cues:

Instruction from supervisor

111. Task Performance Procedures:

A. When a decision must be made, indicate alternatives as "Yes-No" answers to questions.

B. List performance steps by most frequently occuring sequence.

TASK ELEMENTS	Decisions		Go To Step	Tools, References, Work Aids
	Yes	No		
1. Put on protective gear.			2	T.A.C. Y-1
2. Determine type of metal to be welded.			3	
3. Set-up arc welding equipment.			4	Equipment manual
4. Is there a fire hazard in the immediate work area?	5	6		
5. Have someone stand fire watch or remove fire hazard.			6	
6. Shut off electricity to track and lockout.			7	
7. Clean surface to be welded using wire brush or power grinder.			8	
8. Attach correct low hydrogen rod for mild steel.			9	
9. Make first pass filling up worn area on track.			10	
10. Are welding variables correct for conditions?	11	19		
11. Clean off flux and slag.			12	
12. Make another pass and clean off flux and slag.			13	
13. Repeat step #12 until worn area is filled up.			14	
14. Is weld a good weld?	15	20		T.A.G. X-1
15. Grind weld until flush with track.			16	
16. Is weld a good weld?	17	20		
17. Put away tools and equipment.			18	
18. Clean up work area.		E.O.T.		
19. Correct welding variables.			15	
20. Make another pass or re-weld.			14	

TASK LIMITS

TASK I.D. and STATEMENT: E-16, S.M.A.W. mild steel overhead tracks to repair worn area

Limit#1 , Work Orders
Variables:
- Written
- Verbal

Limit#2 , Protective Gear & Equipment
Variables:
- Tempered glasses
- Helmet
- Gloves

Limit#3 , Metal Identification
Variables:
- Visual for color
- Hardness
- Lab analysis

Limit#4 , Arc Welding Equipment
Variables:
- Lincoln
- Holbert
- Miller
- Clamps
- Grounds
- Generator

Limit#5 , Fire Hazards
Variables:
- Dust
- Oil
- Pattern spray
- Gas fumes

Limit#6 , Fire Hazard Removal
Variables:
- Person standing fire watch
- Asbestos cover
- Clean-up

Limit#7 , Electric Power Disconnect
Variables:
- Main disconnect
- Fuse disconnect

Limit#8 , Clean Weld Surface
Variables:
- Grinder
- Body sander
- Solvent

Limit#9 , Welding Rods
Variables:
- Fleetweld 180 1/8"
- 5/32"

TASK LIMITS

TASK I.D. and STATEMENT: E-16 Cont.

Limit#10, Weld Start

Variables:
- Amps
- Temperature
- Arc length
- Arc to metal distance
- Position
- Angle
- Strike arc

Limit#11, Welding Positions

Variables:
- Overhead

Limit#12, Weld Types

Variables:
- Vertical up & down
- Horizontal

Limit#13, Welding Variables

Variables:
- Amps
- Temperature
- Arc length
- Arc to metal distance

Limit#14, Welding Variables Adjustment

Variables:
- Amps
- Temperature
- Arc length
- Arc to metal distance

Limit#15, Clean Flux

Variables:
- Chipping hammer

Limit#16, Clean Slag

Variables:
- Chipping hammer

Limit#17, Weld Inspection

Variables:
- Cracks
- Holes

Limit#18, Grind Weld

Variables:
- Body grinder

TASK LIMITS

TASK I.D. and STATEMENT: E-16 Cont.

Limit#19, Tool & Equipment Return

Variables:

- Tool box
- Tool crib
- Tool room

Limit#20, Clean Work Area

Variables:

- Safety
- Neat Appearance

Limit#21, Weld Restart

Variables:

- Amps
- Temperature
- Arc length
- Arc to metal distance

Limit#22, Re-Weld

Variables:

- Scarf
- Amount of filler metal

Limit# , _____

Variables:

Limit# , _____

Variables:

Limit# , _____

Variables:

Limit# , _____

Variables:

Limit# , _____

Variables:

Limit# , _____

Variables:

Appendix B-8.

DANA CORP

Performance Based Industrial Training

WELD PERFORMANCE

Procedure SHEET

NAME _____

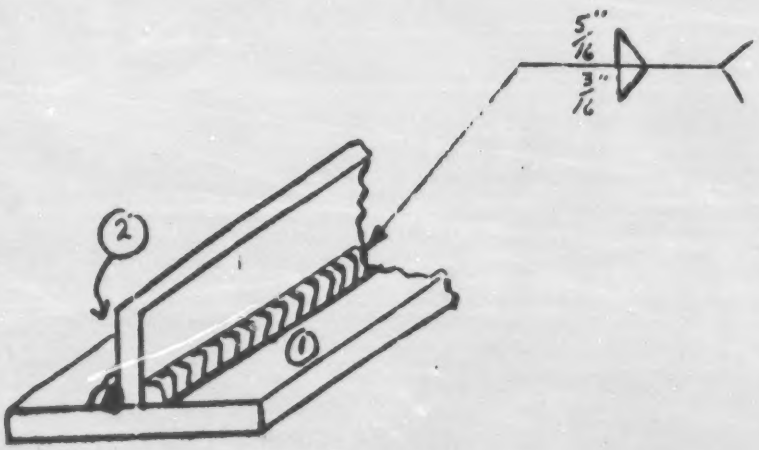
DATE _____

TIME _____

PLATE #2

METAL	Mild Steel PLATE 3/16 or 1/4" x 2½ x 6
Joint Design	90° TEE JOINT NO BEVEL
FIT - UP	TIGHT FIT
PROCESS	Shielded METAL ARC Weld.
POSITION	HORIZONTAL
ELECTRODE SIZE	(SIDE #1 E-6011) (SIDE #2 E-7014) DCSP 1/8" 1/8"
Specifications	SIDE #1 Single PASS Size 3/16" SIDE #2 3 PASS MULTIPLE STRINGER SIZE 5/16" STOP EACH PASS 1" short of preceeding PASS.

EVALUATION



Don Gordon
cc. Betty Giboney
Darrel Radford

Appendix B-9.

3/9/82

Seven Dana maintenance workers receive certificates for completion of 21 hours of specific training. A special recognition luncheon was sponsored by Dana Corporation to recognize the employees who received certificates from the New Castle Area Vocational School.

Dana Corporation has been the first company in Henry County to be involved with job specific training for its employees. Approximately one year ago, Don Gordon, Work Analysis Specialist, NCAVS, began work with Craig Fowler, Industrial Relations Manager, and Jack Pew, Assistant Maintenance Manager, Dana Corporation to establish the data base and to develop the schedule for the training.

This training program is custom made for industry workers. The design of the program is achieved through the use of special data collection and training known as Performance Based Industrial Training or Training for Profit. The PBIT-TfP method requires identification of job titles in the company, the identification of the tasks performed under the job titles, analysis of these tasks showing the steps and order of activities to be completed, and the identification of the knowledge and performance skills the worker must have in order to complete the tasks.

Through interviews with experts and observing the tasks performed, the work requirements are identified, and when compiled, provide the data for performance based, job training that is measurable and cost-effective.

Based on the data collected and the priorities of Dana Corporation, the first PBIT program involved the maintenance employees. Prior to the first phase of the training, the employees were given a pre-test to match the specific training with the skills and needs of each worker. The first phase of the program consisting of 21 hours of training was then conducted at the vocational lab. This phase was completed in December. The second phase of the training will be in-plant training which will be conducted within the next month.

The cost for this training program was shared by the State Board of Vocational and Technical Education through the project, the New Castle Area Vocational School, Dana Corporation, and the maintenance employees who participated in the 21 hour training program.

Present at the luncheon in addition to the seven employees were John Wright, Plant Manager, Craig Fowler, Industrial Relations Manager, Dana Corporation; Beverly Hankenhoff, Area Vocational Director, New Castle Area Vocational School, Don Gordon, Work Analysis Specialist, Jan Conway, welding instructor for the program, and Brenda Leduc, NCAVS Secretary.

The seven maintenance employees who received the certificates were: Gary Baughan, Keith Bean, John Bryson, Ray Johnson, Jack Pew, John Stillwell, Ron Walcott.

The luncheon was held at ACE with the meal prepared by the students in the vocational food management lab under the supervision of their instructor, Viola Schuler.

FOR RELEASE

Beverly Hankenhoff
1305 C Avenue
New Castle, IN 47362
529-8434

March 9, 1982

Appendix B-10.

Dana Maintenance

21 Hour Training

Report

I. Task A-2 - S.M.A.W. butt joint on cast iron.
   A. Outline Welding applications, cast iron.
      1. Activity - Braze weld casting, and Oxy-acetylene fusion weld cast iron.

II. Task B-1 - S.M.A.W. to repair sand pipe using butt joint.
   B. Outline Straight carbon and alloy steel.
      1. Activity - Flat butt joint M.S. and vertical down butt joint one pass.

III. Task C-6 - S.M.A.W. light gauge metal using corner weld to fabricate guard for belt on machinery.
   C. Outline Basic joint and positions, and fusion welding of steel.
      1. Activity - Gauge metal welding, on corner joint of 14 gauge steel with 3/32" E-60B or E-7014.

IV. Task E-1 - S.M.A.W. mild steel machinery to repair shaft using stitch weld pattern.
   D. Outline S.M.A.W. maintenance welding, straight carbon and alloy steels.
      1. Activity - Vertical butt joint mild steel one pass with E-6011 vertical-up tee weld, two pass on mild steel with E-7018. Stringer plus stitch weld.

V. Task E-16 - S.M.A.W. mild steel overhead tracks to repair worn area.
   E. Outline Machine set-up, polarity, amperage, electrode selection for S.M.A. welding.
      1. Activities - Overhead butt weld with E-6011. Overhead tee weld with E-6011.

VI. Task F-7 - S.M.A.W. mild steel to salvage skimmer.
   F. Outline Welding applications straight carbon and alloy steels.
      1. Activities - Flat position, butt and fillet welds with E-6011 and E-7014.

VII. Task F-18 - S.M.A.W. mild steel using overhead weld.
   G. Outline Electrode selections. Basic joint and positions.
      1. Activity - Butt, and tee joints done in the overhead position using E-6011 electrodes.

VIII. Task G-2 - S.M.A.W. manganese to patch fixture for wheelabrator.
H. Outline Welding applications, straight carbon and alloy steels.
1. Activity - Demonstration weld with E-7018 vertical-up position.

IX. Task M-1 - Oxy-acetylene weld mild steel to fabricate belt guard for machinery.
I. Outline Oxy-fuel, welding mild steel.
Oxy-fuel, brazing mild steel.
1. Activity - Oxy-acetylene weld mild steel edge weld, and braze weld on bolt, and gauge metal.

X. Task W-7 - Silver Solder using oxy-acetylene torch to repair upper coil on furnace.
J. Outline Brazing.steel and cast iron.
1. Activities - Silver braze ends of bolts together.

XI. Task X-1 - Test and inspect the weld.
K. Outline Weld testing, non destructive and destructive.
1. Activities - Visual weld inspections, destructive test of tee weld, and tensional test of standard S.A.E. Bolts, discussion of: Tensil, and guided U-bend testing.

Appendix B-11.

Dana Maintenance

30 Tasks

Report

I. Task Y-1 - Use protective equipment and gear for arc welding.
Task Y-2 - Use protective equipment and gear for oxyacetylene welding.
A. Outline S.M.A.W. equipment: Set-up, polarity, amperage Oxy-Fuel set-up, tear down, safety procedures.
1. Activity - Set-up equipment, using various techniques and joints with oxy-fuel, and S.M.A.W.

II. Task A-1 - Shielded metal arc weld (S.M.A.W.) "T" joint on cast iron.
Task A-2 - S.M.A.W. butt joint on cast iron.
Task A-3 - S.M.A.W. inside corner joint on cast iron.
Task A-4 - S.M.A.W. lap joint to fill in hole on cast iron.
B. Outline Welding applications, cast iron.
1. Activity - Braze weld casting, and Oxy-acetylene fusion weld cast iron.

Task A-5 - Shielded metal arc scarf on cast iron.
N/A

III. Task B-1 - S.M.A.W. to repair sand pipe using butt joint.
Task B-2 - S.M.A.W. rings to pipe using fillet weld.
Task B-5 - S.M.A.W. to repair crack to pressure pipe using fillet weld.
Task B-7 - S.M.A.W. pipe and angle iron to fabricate railing.
C. Outline Straight carbon and alloy steel.
1. Activity - Flat butt joint M.S. and vertical
2. Activity - Vertical fillets up E-7018.

IV. Task C-6 - S.M.A.W. light gauge metal using corner weld to fabricate guard for belt on machinery
D. Outline Basic joint and positions, and fusion welding of steel.
1. Activity - Gauge metal welding, on corner joint of 14 gauge steel with 3/32" E60B or E-7014.

V. Task D-1 - S.M.A.W. aluminum using flat weld to patch mold machine pattern.
Task D-2 - S.M.A.W. aluminum band for core machine using V'd out butt joint.
No Training

VI. Task E-1 - S.M.A.W. mild steel machinery to repair shaft using stitch weld pattern.
E. Outline S.M.A.W. maintenance welding, straight carbon and alloy steels.
1. Activity - Vertical butt joint mild steel one pass with E-6011 vertical-up tee weld, two pass on mild steel with E-7018. Stringer plus stitch weld.

Task E-4 - S.M.A.W. mild steel furnace lid to repair.
N/A

Task E-16 - S.M.A.W. mild steel overhead tracks to repair worn area.
F. Outline Machine set-up, polarity, amperage, electrode selection for S.M.A. welding.
1. Activity - Overhead butt weld with E-6011. Overhead tee weld with E-6011.

VII. Task F-1 - S.M.A.W. mild steel using butt joint.
Task F-2 - S.M.A.W. mild steel using lab joint.
Task F-3 - S.M.A.W. mild steel using inside corner joint.
Task F-4 - S.M.A.W. mild steel using "T" joint.
Task F-5 - S.M.A.W. mild steel using vertical upweld corner joint.
Task F-7 - S.M.A.W. mild steel to salvage skimmer.
G. Outline Welding applications straight carbon and alloy steels.
1. Activity - Flat position, butt and fillet welds with E-6011 and E-7014.
2. Activity - Overhead fillets E-7018.

Task F-18 - S.M.A.W. mild steel using overhead weld.
H. Outline Electrode selections. Basic joint and positions.
1. Activity - Butt, and tee joints done in the overhead position using E-6011 electrodes.

VIII. Task G-2 - S.M.A.W. manganese to patch fixture for wheelabrator.
I. Outline Welding applications, straight carbon and alloy steels.
1. Activity - Demonstration weld with E-7018 vertical-up position.

IX. Task I-1 - S.M.A.W. perforated steel to fabricate cat-walk.
No Training

X. Task M-1 - Oxyacetylene weld mild steel to fabricate belt guard for machinery.
J. Outline Oxy-fuel, welding mild steel. Oxy-fuel, brazing mild steel.
1. Activity - Oxy-acetylene weld mild steel edge weld, and braze weld on bolt, and gauge metal.

XI. Task N-3 - Oxyacetylene cut hard steel bearing race off shaft.
No Training

X. Task W-7 - Silver solder using oxyacetylene torch to repair copper coil on furnace.
K. Outline Brazing steel and cast iron.
1. Activity - Silver braze ends of bolts together.

XI. Task X-1 - Test and inspect the weld.
L. Outline Weld testing, non destructive and destructive.
1. Activity - Visual weld inspections, destructive test of tee weld, and tensional test of standard S.A.E. Bolts. discussion of: Tensil, and guided U-bend testing.

TASK by DOMAINS (Groups)
Modernfold - Plant #2

A. DOMAIN: Spot Weld (Resistance)- Special Parts, sub-assembly

TASKS:
1. Retainer brackets to sub frame - not included in training
2. Channel spacers to number two (2) channel
3. Channel caps to number two (2) channel for pass door assembly

B. DOMAIN: Spot Weld (Resistance)- Panel Line, sub-assembly

TASKS:
1. Trolley block to channel
2. Channel to channel for sub-assembly
3. Channel to hinge plate
4. Stack plate to channel
5. Splice channel to two (2) channels
6. Cold roll steel to galvanized steel
7. Galvanized channel to galvanized channel
8. Spot weld jam to channel
9. Spot weld nose to channel

C. DOMAIN: Spot Weld (Resistance)- Panel Line

TASKS:
1. .028 skin to .054 channel
2. .033 skin to .054 channel

D. DOMAIN: Spot Weld (Resistance)- Panel Line, Squaring Table

TASKS:
1. Ends and top (skin to channel) of panel
2. Top, ends and bottom (top skin to channel) of panel

E. DOMAIN: Wire Weld (M.I.G.)- Special Parts, sub-assembly

TASKS:
1. Nut 8616 to block 3810
2. Clevice 5487 to angle 665
3. Puck 7784 to plate 5426
4. Leg 286 to plate 2999

WELDING TASKS CONT.

5. Tube 7504 to 1077 sub-assembly
6. Anchor 1450 plus guide 1419 to channel 1420
7. Guide assembly 1415 and brace 3483 to bracket 1414 to make 055 top bracket 1413
8. Guide bracket 666 to gray iron casting 9155

F. DOMAIN: Wire Weld (M.I.G.)- Bud Anders, sub-assembly, trolleys

TASKS:
1. Spacer to #14 trolley carrier
2. Safety block to top carrier
3. Out rigger bracket to trolley
4. Cold roll steel to gray iron casting
5. Angle iron and seamless tubing to stamped steel plate for pass door seal assembly
6. Top direction guide (rod to steel)
7. Tall wall trolley block to top channel
8. Top reinforcement bracket trolley anchor (1413)
9. Two pegs to trolley bolt anchor mounting channel
10. Cold roll steel to seamless tubing
11. Drop seal adjustment threaded rod for S-3 drop seals

G. DOMAIN: Wire Weld (M.I.G.)- Panel Line

TASKS:
1. .054 corner brackets to .054 channel
2. .054 light corner bracket to .054 channel
3. 3/16" anti-float mechanism to .054 channel on pass door

H. DOMAIN: Stick Weld (Shielded Metal Arc)- Panel Line, sub-assembly

TASKS:
1. .033 skin to channel to form cavity
2. Channel spacers to two (2) channels to make channel assembly
3. Trolley to two (2) channels
4. Full length two (2) hole trolley bar to channel
5. Tubing to channel on pass door frame
6. Tubing to tubing for pass door frame

WELDING TASKS CONT.

I. DOMAIN: T.I.G. Weld- Sub-assembly Hypothetical

TASKS:
1. Hot roll steel to cold roll steel
2. Galvanized to cold roll
3. Galvanized to galvanized
4. Cold roll steel to cold roll steel

J. DOMAIN: Equipment Set-up

TASKS:
1. Set-up spot welding equipment (Resistance)
2. Set-up wire welding equipment (M.I.G.)
3. Set-up stick welding equipment (Shielded Metal Arc)
4. Set-up T.I.G. welding equipment

K. DOMAIN: Weld Inspection

TASKS:
1. Inspect the weld

L. DOMAIN: Safety Gear and Equipment

TASKS:
1. Put on safety gear and equipment for spot welding (Resistance)
2. Put on safety gear and equipment for wire welding (M.I.G.)
3. Put on safety gear and equipment for stick welding (Shielded Metal Arc)
4. Put on safety gear and equipment for T.I.G. welding

M. DOMAIN: Spot Weld - Passdoor Area

TASKS:
1. .033 skin to .054 channel to form cavity

TASK ANALYSIS GUIDE

Appendix B-13.

I.D. NO. M-1

Modernfold

1. Task Statement:

Spot weld .033 skin to .054 channel to form cavity

11. Task Performance Cues:

Instruction from supervisor

111. Task Performance Procedures:

A. When a decision must be made, indicate alternatives as "Yes-No" answers to questions.

B. List performance steps by most frequently occuring sequence.

TASK ELEMENTS	Decisions		Go To Step	Tools, References, Work Aids
	Yes	No		
1. Observe safety rules.			2	
2. Put on protective gear.			3	
3. Is there a fire hazard in the immediate work area?	4	5		
4. Remove the fire hazard.			5	
5. Check work order to determine size of skins.			6	
6. Obtain skins and channels.			7	
7. Lay the transom skin and the two leg skins on the work table.			8	
8. Weld the inside horizontal channel to the transom skin width wise according to blueprint.			9	
9. Determine which side takes the hinge on the inside vertical channel.			10	
10. Line leg skins to leg channels at bottom edge.			11	
11. Clamp leg skins to leg channels to secure.			12	
12. Are skins & channels properly aligned?	13	32		

TASK ELEMENTS	Decisions		Go To Step	Tools, References, Work Aids
	Yes	No		
13. Weld the leg skins to the leg channels.			14	
14. Line leg skins and channels to the top skins.			15	
15. Obtain 3x5 .054 plate.			16	
16. Locate plate 1/8" from inside channel dimension with long side of plate in vertical position.			17	
17. Are all parts in proper alignment?	18	33		
18. Spot weld plate to skin using four welds on each vertical side.			19	
Repeat steps to locate and weld plate on other side.			20	
20. Obtain outside vertical channels.			21	
21. Line vertical channels to top skin.			22	
22. Clamp in position.			23	
23. Are channels properly aligned to top skin?	24	34		
24. Spot weld channels to skin on both sides beginning at the top and spacing down every four inches and 1/2" from outside edge.			25	
25. Check work order for "X" dimension.			26	
Set horizontal channel in top and locate within the "X" dimension.			27	

TASK ELEMENTS	Decisions		Go To Step	Tools, References, Work Aids
	Yes	No		
27. Line the horizontal channel to top of skin.			28	
28. Clamp in position.			29	
29. Are parts properly aligned?	30	35		
30. Spot weld every four inches on center.			31	
31. Are all welds good welds?	EOT	36		
32. Realign skins and channels.			13	
33. Properly align parts.			18	
34. Align channels to top skin.			24	
35. Properly align parts.			30	
36. Re-weld as necessary.			EOT	

TRAINING PROGRAM in PRODUCTION WELDING at MODERNFOLD

SYNOPSIS

Company and Location: Modernfold, a Division of American Standard, Inc. Plant #2, Rd. 300 South, New Castle, Ind.

Type of Training: Production (in-process) welding for fabrication of panels and panel parts.

Training Program Developed by: The Work Analysis Project - New Castle Area Vocational School.

Training Provided by: The New Castle Area Vocational School, Ms. Beverly Hankenhoff, Director.

Training Instructor: Mr. Jeff Smiley

Training Dates: Feb. 15th through Feb. 26th, 1982

Number of Training Hours Approved: 20 hours

Number of Workers to be Trained and Classifications: Classified as fabricators or mechanics. 13 workers.

PROGRAM DEVELOPMENT

The Performance Based Industrial Training (PBIT) method was used to develop the data base and content for the training. Welding tasks for each welding process and department were identified and placed in homogeneous groups. The tasks to

TRAINING PROGRAM CONT.

be included in the training and the areas of emphasis were determined and priority ranked. Selected tasks were analyzed and Task Analysis Guides developed with task limits. The workers to be trained in specific task performance were identified by company personnel. Company personnel, the Vocational School Work Analysis Specialist, and other staff and outside experts, worked in a highly cooperative manner to develop the program content.

TRAINING CONTENT (Also see Priority List)

Welding Process: Shielded Metal Arc (Stick) Welding
Resistance (Spot) Welding
M.I.G. (Wire) Welding
T.I.G. Welding - optional

Tasks: Shielded Metal Arc - 5 tasks
Resistance - 8 tasks
M.I.G. - 7 tasks
T.I.G. - Introductory material for set-up and process, optional

Areas of Emphasis; Safety, equipment set-up and adjustments, importance of welding to the manufacturing process, welding quality, welding consistency, types of weld, amount of weld, weld inspection, steps taken to complete each task.

APPROACH

The number of hours of training per worker varies according to the tasks assigned and proficiency level. Training is done in groups not larger than four (4) persons and takes place at the work station. The actual work task is used to teach

TRAINING PROGRAM CONT.

the training content. Content is limited to the information the worker needs to know to complete the task at the work site. The instructor individualizes the training and his methods to best facilitate learning by each worker.

Appendix B-15.

TRAINING PROGRAM in PRODUCTION WELDING at MODERNFOLD - PLANT #2

TRAINING PRIORITY # 1- Corner Bracket

Task G-1- Wire (M.I.G.) weld .054 corner brackets to .054 channel

Persons to be Trained- Don Wood, Terry Sutherland, Jim Cole, Jeff Swift

Possible Amount of Time Needed- 1 Hour

TRAINING PRIORITY # 2- Barney Jolly's Area

Task A-2- Spot weld channel spacers to number 2 channel

A-3- Spot weld channel caps to number 2 channel for pass door assembly

B-2- Spot weld channel to channel for sub-assembly

H-2- Shielded metal arc weld channel spacers to two channels to make channel assembly

H-4- Shielded metal arc weld full length two hole trolley bar to channel

Persons to be Trained- Barney Jolly, Jim Cole, Nancy Laurey, Terry Sutherland

Possible Amount of Time Needed- 3 1/2 to 4 Hours

TRAINING PRIORITY # 3- Tom Painter's Area

Task E-7- Wire weld guide assembly 1415 and brace 3483 to bracket 1414 to make 055 top bracket 1413

F-1- Wire (M.I.G.) weld spacer to number 14 trolley carrier

F-5- Wire (M.I.G.) weld angle iron and seamless tubing to stamped steel plate for pass door seal assembly

F-9- Wire (M.I.G.) weld two pegs to trolley bolt anchor mounting channel

F-11- Wire (M.I.G.) weld drop seal adjustment threaded rod for S-3 drop seal

Persons to be Trained- Tom Painter, Gene Wise, Ernie Jones

Possible Amount of Time Needed- 3 1/2 to 4 Hours

TRAINING PRIORITY # 4- Terry Sutherland's Area- Pass Door

Task G-3- Wire (M.I.G.) weld 3/16" anti-float mechanism to .054 channel on pass door

H-3- Shielded metal arc weld trolley to two channels

H-5- Shielded metal arc weld tubing to channel on pass door frame

H-6- Shielded metal arc weld tubing to tubing for pass door frame

M-1- Spot weld .033 skin to .054 channel to form cavity

TRAINING PROGRAM CONT.

Persons to be Trained- Terry Sutherland, William Hauntz, Jim Cole, Frank Mecklenberg

Possible Amount of Time Needed- 3 1/2 to 4 Hours

TRAINING PRIORITY # 5- John Jones' Area

Task B-8- Spot weld jam to channel

B-9- Spot weld nose to channel

Persons to be Trained- John Jones, Terry Sutherland, Don Wood, Frank Mecklenberg

Possible Amount of Time Needed- 2 Hours

TRAINING PRIORITY # 6- Squaring Table and Panels

Task D-1- Spot weld ends and top (skin to channel) of panel

D-2- Spot weld tops, ends and bottom (top skin to channel) of panel

Persons to be Trained- Terry Sutherland, David Laboyteaux, Frank Mecklenberg, Jeff Swift

Possible Amount of Time Needed- 1 Hour

TRAINING PRIORITY # 7- T.I.G. Welding

This training is optional. Any training provided will focus on set-up and process and other introductory information.

Persons to be Trained- Terry Sutherland, Dave Coatie, Gene Wise

Possible Amount of Time Needed- Undetermined

In Plant Welding Training Program for Supervisors

March 2, 1982

CONTENT

1. Welding processes and their application in plant
   a. S.M.A.W. - Shielded metal arc welding
   b. G.M.A.W. - Gas metal arc welding
   c. G.T.A.W. - Gas tungsten arc welding
   d. Resistance Welding - spot welding
2. Welding Safety
3. Equipment
   a. In plant
   b. Care of
   c. Trouble shooting
4. Essentials for Proper Welding
   a. Choosing the correct electrode
   b. Using the correct current
   c. Using the correct length
   d. Using the correct travel speed
   e. Using the correct electrode angle
5. Causes and Cures of Common Welding Troubles
6. Visual Inspection of the Weld
7. Welding Terms Used In Plant-Definitions
8. Review and Open Discussion

NOTES:

1. This training is scheduled for Saturday, March 12th, 1982
2. The class will meet from 8 a.m. - 12 Noon
3. Training location is Modernfold Plant #2
4. Training will take place primarily in the production area on the floor of the plant rather than in a side room. A clip board for each person attending is recommended.

INSTRUCTOR: Jeff Smiley

SPONSORED BY: The New Castle Area Vocational School,
Beverly Hankenhoff, Director

IN-PLANT TRAINING-MODERNFOLD PLANT 2

Report by instructor

I found most employees helpful in giving information - but some information was misleading. I felt if the employees had a better understanding of what Don and I were trying to do when making the task analysis, they would have been able to give more accurate information and in turn would have went much smoother. Also, employees seemed skeptical of our presence. I think if management had given some general information to the employees about the program, it would have helped a great deal. Once the training got underway, the employees I trained seemed interested and willing to learn.

Most welding done in-plant was (resistance welding) spot welding which is well suited for their application on thin gauge metal, but in some areas where a weld (head) must be used, they were using a very slow and unclean process SMAW-Arc weld which is hard to handle on thin gauge metal, also difficult to train the operator. I would suggest a GMAW-MIG welding process which is much cleaner, has no harmful fumes, 50% faster, and a new operator can be trained in two-three hours. Also thin gauge metal can be welded easily, and is much cheaper to operate. They have this type of equipment in-plant.

In the area where the counter weight to chanel was welded they were having a problem with warping. This problem could be solved by using the MIG welding process and a joint called (slot weld). This should save a great deal of time and speed up production.

I believe the task analysis and training program to be a very positive effort towards improving industry.

Appendix B-18

November 1982

TASK LIST-PARKER HANNIFIN, CORP.

GNUTTI TRUNNION VERTICAL INDEXING MACHINE

Otsego, Michigan

TASK #	TASK
1.	Start-up Gnutti trunnion vertical indexing machine
2.	Shut down Gnutti trunnion vertical indexing machine
3.	Install Master Jaws and jaw inserts on Gnutti trunnion vertical indexing machin
4.	Center Master Jaws on Gnutti trunnion vertical indexing machine
5.	Install spindle adapter on right side spindle (s) on Gnutti trunnion vertical indexing machine
6.	Install radial spindle adapter on Gnutti trunnion vertical indexing machine
7.	Install multiple spindle drill assembly on right side spindle (s) on Gnutti trunnion vertical indexing machine
8.	Install tooling on Gnutti trunnion vertical indexing machine
9.	Remove and replace recess cutter on Gnutti trunnion vertical indexing machine
10.	Set-up M1D and M1R threading heads on Gnutti trunnion vertical indexing machine
11.	Set-up M2D threading head on Gnutti trunnion vertical indexing machine
12.	Make adjustments on recess head on Gnutti trunnion vertical indexing machine
13.	Make adjustments on pneumatic activated head (s) on Gnutti trunnion vertical indexing machine
14.	Make adjustments on F3R head on Gnutti trunnion vertical indexing machine
15.	Set spindle speed on threading head (s) on Gnutti trunnion vertical indexing machine
16.	Set spindle speed on drill head (s) on Gnutti trunnion vertical indexing machin
17.	Set spindle speed on F3R drill head on Gnutti trunnion vertical indexing machin
18.	Maintain oil level at heads on Gnutti trunnion vertical indexing machine
19.	Maintain machine lubrication oil level on Gnutti trunnion vertical indexing machine
20.	Maintain line air filter and lubrication on Gnutti trunnion vertical indexing machine
21.	Maintain hydraulic fluid level on Gnutti trunnion vertical indexing machine
22.	Maintain coolant level on Gnutti trunnion vertical indexing machine
23.	Process production part on Gnutti trunnion vertical indexing machine
24.	Clean Gnutti trunnion vertical indexing machine

Appendix B-19.

Carl M. Hall 11/18/82

COMPANY: Parker Hannifin, Corp.

DEPARTMENT: Primary Machining

JOB TITLE: Set-up Operator

TASK: Set-up M1D and M1R threading heads on Gnutti trunnion vertical indexing machine

TASK NO: 10

CUE: Required for job set-up

TASK ELEMENT	Step	Decision		NOTES	VARIABLES/LIMITS
		Yes	No		Master control panel A. "DOOR AJAR OVERRIDE" key operated selector switch B. "CONTROL PANEL" key operated selector switch Remote control panel A. "SPINDLE START" pushbutton B. "SPINDLE ADVANCE" pushbutton C. "STOP" pushbutton Operator station control panel A. "INDEX" pushbutton B. "JAW OPEN" pushbutton C. "STOP" pushbutton D. "PALM" pushbutton-left side E. "PALM" pushbutton-right side F. "SPINDLE START" pushbutton G. "SPINDLE ADVANCE" pushbutton H. "SPINDLE RETURN" pushbutton
1. Is machine started up?		2	67	Finished part is in machine Lights on master control panel are lit if machine is started up "MAIN POWER DISCONNECT" lever on master control	

78

79

TASK: Set-up M1D and M1R threading heads on Gnutti trunnion vertical indexing machine

TASK ELEMENT	Step	Decision		NOTES	VARIABLES/LIMITS
		Yes	No		
				panel will be in On position	
2. Is M1D head being set-up?		3	68	Operator chooses head to be set-up first ~~This task covers M1D and M1R heads~~	HEAD (S): B. M1. B. M1
3. Turn "DOOR AJAR OVERRIDE" key operated selector switch on master control panel to Right doors position. (Lock-out)	4			~~Turn clockwise~~ Overrides door ajar limit switches on housing doors on right side of machine Allows operation of machine when doors are open	
4. Open doors to housing for M1D head.	5			On right side of machine as operator faces operator control station	
5. Check sources for lead screw, half nuts, thread depth of part, dial calipers, forging orientation needed for job.	6			All parts are numbered on process sheet Lead screw & half nuts are matched to part Pitch is labeled on screw and half nuts Pitch means number of threads per inch	Sources for lead screw, half nuts, threa depth, dial calipers, forging orientatio A. Process sheet B. Foreman
6. Get ~~Obtain~~ lead screw, half nuts, thread depth gauge at tool crib from attendant	7			~~Obtain at tool crib from attendant~~	Pitch of lead screws & half nuts A. 20 or 24 pitch

TASK: Set-up M1D and M1R threading heads on Gnutti trunnion vertical indexing machine

TASK ELEMENT	Step	Decision		NOTES	VARIABLES/LIMITS
		Yes	No		
7. Locate head in housing.	8				Location of heads A. M1D-right side of machine, lower left in housing B. M1R-rear of machine, upper head in housing
8. Loosen compression not on lead screw lubrication line.	9			Use 9mm open end wrench Line is flexible opaque color tubing	
9. Remove line from head screw.	10			Manually pull free	
10. Remove four 4mm socket head cap screws on top lead screw half nut cap.	11			Use 5mm allen wrench Cap located on lead screw half nut housing	Lead screw half nut caps A. Top cap B. Bottom cap
11. Remove cap and lead screw half nut from holder.	12			Manually pull up on cap ~~Pull up on cap~~	
12. Remove four 4mm socket head cap screws on bottom lead screw half nut cap.	13			Use 5mm allen wrench Cap located below top cap on other side of housing	
13. Slide wrench in end of spindle. Turn counter-clockwise	14			Use four prong "T" wrench located at machine	
14. ~~Loosen and remove~~ two nuts that ~~is~~ holding lead screw in spindle and remove nuts	15			Use "T" wrench in end of spindle ~~Turn nuts counter clockwise~~	

TASK: Set-up M1D and M1R threading heads on Gnutti trunnion vertical indexing machine

TASK ELEMENT	Step	Decision		NOTES	VARIABLES/LIMITS
		Yes	No		
15. Remove lead screw.	16			Lead screw slides out	
16. Put in required lead screw.	17			Keyway end of lead screw goes in first	
17. Replace and tighten two nuts that hold lead screw in spindle.	18			Use "T" wrench	
18. Put lead screw half nut on bottom cap.	19				
19. Slide lead screw half nut and cap into position in housing.	20			Keyway on half nut lines up with keyway on half nut holder on cap Push up to slide in	
20. Replace and tighten four 4mm socket head cap screws that hold half nut cap in place.	21			Use 5mm allen wrench	
21. Put lead screw half nut on top cap.	22				
22. Slide lead screw half nut and cap into position.	23			Keyway on half nut lines up with keyway on half nut holder on cap Push down to slide in	
23. Replace and tighten four 4mm socket head cap screws that hold half nut cap in place.	24			Use 5mm allen wrench	

TASK: Set-up M1D and M1R threading heads on Gnutti trunnion vertical indexing machine

TASK ELEMENT	Step	Decision		NOTES	VARIABLES/LIMITS
		Yes	No		
24. Attach lead screw lubrication line.	25				
25. Tighten compression nut on line.	26			Use 9mm open end wrench	
26. Measure distance from end of finished part in machine to end of tap.	27			Use 6" machinist scale	
27. Add this distance to thread depth called out on process sheet.	28				
28. Loosen 6mm set screw on forward limit switch collar.	29			Use 3mm allen wrench Loosens collar allowing it to be adjusted Collar will slide	Limit switch collars A. Forward collar B. Return collar
29. Move collar until distance between forward limit switch and collar equals figure in element #27 above (distance from end of part to end of tap plus thread depth required).	30				Range collar movement A. 0 to 3.9375 inches
30. Tighten 6mm set screw on forward limit switch collar.	31			Use 3mm allen wrench	
31. Measure distance from end of tap to start of thread in part.	32			Use 6" machinist scale	
32. Is distance at least 40mm?		33	69	Distance should have been set before tool holder was installed in machine Use machinist scale (7)	(2)

TASK: Set-up M1D and M1R threading heads on Gnutti trunnion vertical indexing machine

TASK ELEMENT	Step	Decision		NOTES	VARIABLES/LIMITS
		Yes	No		
33. Press "SPINDLE START" pushbutton on remote control panel.	34			Spindle will rotate	
34. Press "SPINDLE ADVANCE" pushbutton on remote control panel.	35			Spindle will advance Be prepared to press "STOP" before spindle returns Wait is	
35. Wait for spindle to advance to forward limit.	36			About 3 second wait	
36. Immediately press "STOP" pushbutton on remote control panel.	37				
37. Add .5" to thread depth dimension on process sheet.	38			Thread depth is distance from end of part to last full thread cut	
38. Loosen 6mm set screw on return limit switch collar.	39			Use 3mm allen wrench Allows collar to slide	
39. Move return limit switch collar to figure found in element #37 above (thread depth plus .5").	40				
40. Tighten 6mm set screw on return limit switch collar.	41			Use 3mm allen wrench	
41. Press "SPINDLE START" pushbutton on remote control panel.	42			Spindle will rotate	

TASK Set-up M1D and M1R threading heads on Gnutti trunnion vertical indexing machine

TASK ELEMENT	Step	Decision		NOTES	VARIABLES/LIMITS
		Yes	No		
42. Turn "CONTROL PANEL" key operated selector switch on master control panel to Operator station control panel position.	43			Activates Operator station control panel	
43. Press "INDEX" pushbutton on Operator station control panel twice.	44			Part in machine will index to load/unload position	
44. Press "JAW OPEN" pushbutton on Operator station control panel.	45			Jaws will open	
45. Remove part from jaws.	46			Manual	
46. Measure thread depth.	47			Use dial calipers	
47. Subtract measured thread depth from required thread depth stated on process sheet.	48				
48. Is measured thread depth either more or less than depth required on process sheet?		49	EOT	If not more or less, measurement equals required depth on process sheet	
49. Loosen 6mm set screw on forward limit switch collar.	50			Use 3mm allen wrench	
50. Move collar in direction needed until distance between collar and forward limit switch equals the required thread depth.	51				

TASK: Set-up M1D and M1R threading heads on Gnutti trunnion vertical indexing machine

TASK ELEMENT	Step	Decision		NOTES	VARIABLES/LIMITS
		Yes	No		
51. Tighten 6mm set screw on forward limit switch collar.	52			Use 3mm allen wrench	
52. Load a new forging in load/unload station orienting properly.	53			This is first step to process second part	
53. Press "PALM" pushbutton on Operator station control panel simultaneously.	54			Jaws will close	
54. Press "INDEX" pushbutton on Operator station control panel.	55			Trunnion will index to next station	
55. Press "SPINDLE START" pushbutton on Operator station control panel.	56			Spindle will rotate	
56. Press "SPINDLE ADVANCE" pushbutton on Operator station control panel.	57			Spindle will advance Machining is started	
57. Wait for machining cycle to be completed.	58				Cycle completion time A. 12 to 15 seconds
58. Press "INDEX" pushbutton on Operator station control panel.	59			Trunnion will index to next station	
59. Press "SPINDLE RETURN" pushbutton on Operator station control panel.	60			Spindle will return	
60. Press "SPINDLE ADVANCE" pushbutton on Operator station control panel.	61			Spindle will advance Machining is started	

#102

TASK: Set-up M1D and M1R threading heads on Gnutti trunnion vertical indexing machine

TASK ELEMENT	Step	Decision		NOTES	VARIABLES/LIMITS
		Yes	No		
61. Is other machining to be completed?		58	62		
62. Press "INDEX" pushbutton on Operator station control panel twice.	63			Part indexes to load/unload position	
63. Press "JAW OPEN" pushbutton on Operator station control panel.	64			Jaws open	
64. Remove part from station.	65			Manual	
65. Measure thread depth.	66			Use dial calipers	
66. Is thread depth the same as depth required on process sheet?		EOT	52		
67. Start up machine.	2			Follow Task Analysis Guide # 1 "Start up Gnutti trunnion vertical indexing machine"	
68. Remove cover from M1R housing.	5			M1R head is at rear of machine in upper position in housing	
69. Back out nut in collet holding tap.	70				
70. Move tap so distance between end of tap and start of thread in part is at least 40mm.	71			Use machinist scale to set distance	

TASK: Set-up M1D and M1R threading heads on Gnutti trunnion vertical indexing machine

TASK ELEMENT	Step	Decision		NOTES	VARIABLES/LIMITS
		Yes	No		
71. Tighten nut in collet.	33				

TASK LIST-MANDREL LATHE

PARKER HANNIFIN, CORPORATION - DES PLAINES ILLINOIS

Tasks 1 through 12 are set up tasks. They should be completed in the order listed during set up work.

1. Start up mandrel lathe
2. Sort tubing for production run on mandrel lathe
3. Install tooling on headstock and tailstock on mandrel lathe
4. Rough position tailstock on mandrel lathe
5. Install headstock cutting tool on mandrel lathe
6. Finalize tailstock position on mandrel lathe
7. Install tailstock cutting tool on mandrel lathe
8. Rough set headstock tool assembly in-feed on mandrel lathe
9. Set rpm speeds on mandrel lathe
10. Final set headstock cutting tool on mandrel lathe
11. Machine second set up tube on mandrel lathe
12. Change carbide insert (s) on mandrel lathe
13. Operate mandrel lathe in automatic mode

TASK LIST-BARNES HORIZONTAL HONE
PARKER HANNIFIN, CORPORATION-DES PLAINES, ILLINOIS

Tasks 1 through 5 are setup tasks. They should be completed in the order listed during setup work.

1. Start up Barnes horizontal hone machine
2. Install hone head/honing bar assembly on Barnes horizontal hone machine
3. Install and adjust workpiece collar and end stops on Barnes horizontal hone machine
4. Install setup tube on Barnes horizontal hone machine
5. Set up sizing apparatus on Barnes horizontal hone machine
6. Operate Barnes horizontal hone machine in automatic cycle to machine production parts

Appendix B-21.

Type

COMPANY: Parker Hannifin Corporation

DEPARTMENT: Tube preparation

JOB TITLE: Mandrel Lathe Operator

TASK: Install headstock cutting tool on mandrel lathe

TASK NO: 5

CUE: Required for job set up; instruction from foreman

TASK ELEMENT	Step	Decision		NOTES	VARIABLES/LIMITS
		Yes	No		
					Pushbutton station A. "HEAD TOOL" selector switch B. "MANDREL" selector switch C. "QUILL" selector switch D. "SET UP/AUTO/MANUAL" selector switch E. "START" pushbutton F. "EMERGENCY STOP" pushbutton
1. Is machine started up?		2	36	Operator listens for machine engine noise Spindle motor and hydraulic unit are running when machine is started up	
2. Check sources for cutting tool needed for job.	3				Sources for cutting tool A. Set up sheet B. Foreman
3. Get ~~Obtain~~ cutting tool at tool crib.	4				Cutting tools, sizes etc A. B. etc
4. Loosen three ¼" allen bolts on headstock tool holder.	5			Use ¼" allen wrench Bolts secure cutting tool in holder	
5. Clean the cutting tool.	6			Use dry rag to wipe dispose dust with ...	Clean condition criteria for cutting tool A. No metal chips B. No grease build up C. No foreign matter

TASK: Install headstock cutting tool on mandrel lathe

TASK ELEMENT	Step	Decision: Yes	Decision: No	NOTES	VARIABLES/LIMITS
6. Loosen ½" locknut on tool holder allen bolt.	7			Use ½" box wrench Allen bolt is backstop for cutting tool	
7. Backoff 5/32" tool holder allen bolt.	8			Use 5/32" allen wrench	
8. Slide cutting tool into tool holder positioning against backstop.	9			Cutting tool will slide in one way only	
9. Tighten three ¼" allen bolts in headstock tool holder.	10			Use ¼" allen wrench Secures cutting tool in holder	
10. Tighten three ¼" allen bolts in headstock tool a second time.	11			Use ¼" allen wrench Bolts must be tightened a second time	
11. Tighten three ¼" allen bolts in headstock tool holder a third time.	12			Use ¼" allen wrench Bolts must be tightened a third time Bolts should be evenly tightened	Tighten bolts in sequence three times? Until very tight or evenly tightened? - why
12. Press "TOOL SLIDE FEED" pushbutton on machine.	13			Tool slide moves forward to chuck This is a black push-button located below head-stock tool post	
13. Do four screws in tool slide clear face of chuck by at least 1/64"? is this needed? yes - DMG	7	14	37	Visual check	
14. Measure distance between face of cutting tool and face of collet.	15			Use 6" machinist scale	~~Possible Distance between face of cutting tool and face of collet~~ A. is this needed if range needed is 1/8" to 1/16" by machine - DMG
15. Is distance at least 1/16"?		16	40	Minimum O.K.	Distance between face of cutting tool and face of collet A. 1/8" to 1/16"

TASK: Install headstock cutting tool on mandrel lathe

TASK ELEMENT	Step	Decision: Yes	Decision: No	NOTES	VARIABLES/LIMITS
16. Measure distance from face of cutting tool to face of tube at headstock.	17			Use 6" machinist scale	
17. Add 1/16" to distance measured.	18			~~Read instrument~~ measurement to	
18. Loosen four 1½" bolts on tailstock.	19			Use 1½" box wrench Two bolts on each side of machine	
19. Slide tailstock forward by this distance figure.	20			Manual Figure is measured distance plus 1/16"	
20. Measure 3/8" distance from tailstock position on rail.	21			Use 6" machinist scale	
21. Mark this point on the rail.	22			Use grease pencil	
22. Turn "HEAD TOOL" selector switch at pushbutton station clockwise to Reverse position.	23			Headstock moves back	
23. Turn "MANDREL" selector switch at pushbutton station clockwise to Close position.	24			Drawbar moves forward	
24. Slide tailstock forward to mark on rail.	25			Manual	
25. Snug two 1½" bolts on frontside of tailstock.	26			Use 1½" box wrench	
26. Press "TOOL SLIDE FEED" pushbutton on machine.	27			Cutting tool moves forward	
27. Did cutting tool move forward beyond face of tube?		28	37	Visual check	
28. Turn "QUILL" selector switch at pushbutton station clockwise to Reverse position.	29			Quill travels back	

16. ~~16 = 16~~ 16 = 16 ~~16 = 17~~ Change order
17. ~~16 = 16~~ 17 = 16
18. ~~16 = 17~~ 18 = 17
C
I agree but this is the way the instructor wanted it. He did not record since it is a single bolt Dwb

Head Tool selector switch
A. Fwd not needed since only one
B. Rev position is used - Dwb
See rules

Mandrel selector switch
A. Open not needed - Dwb
B. Close
~~Tailstock amount of movement distance possible~~

~~? adjective not right Lathe tailstock? Tighten?~~ Snug is New Quick Talk; is a NEW word used at this time Dwb

TASK: Install headstock cutting tool on mandrel lathe

TASK ELEMENT	Step	Decision		NOTES	VARIABLES/LIMITS
		Yes	No		
29. Turn "SET UP/AUTO/MANUAL" selector switch at pushbutton station counter-clockwise to Auto position.	30			Allows automatic operation of machine	"SET UP/AUTO/MANUAL" selector switch A. Auto position B. Manual position
30. Press "START" pushbutton at pushbutton station.	31			Machine begins operating in automatic	
31. Wait for collet to expand.	32			Visual check Two second wait	
32. Turn "SET UP/AUTO/MANUAL" pushbutton at pushbutton station clockwise to Manual position.	33			Allows manual operation of machine	
33. ~~Tighten~~ Snug four 1½" bolts on tailstock.	EOT			Use 1½" box wrench two bolts on each side of machine	
34. Is machine to be shut down?		35	EOT		Conditions for machine shut down A. End of shift B. Breaktime C. Instruction from foreman
35. Press "EMERGENCY STOP" pushbutton at pushbutton station.	EOT			Turns off spindle motors & hydraulic unit	
36. Start up machine.	2			See task: Start up mandrel lathe	
37. Loosen two 3/8" bolts on tool slide.	38			Use 3/8" allen wrench Bolts secure tool post to rail	
38. ~~Adjust~~ Move tool slide to achieve 1/64" clearance between screws and face of chuck.	39			Manual	

TASK: Install headstock cutting tool on mandrel lathe

TASK ELEMENT	Step	Decision		NOTES	VARIABLES/LIMITS
		Yes	No		
39. Tighten two 3/8" bolts on tool slide.	14			Use 3/8" allen wrench	
40. Backoff 5/32" tool holder allen bolt to achieve 1/16" distance between face of cutting tool and face of collet.	16			Use 5/32" allen wrench Back it away to unscrew in direction of removal	

~~Visit 2 what does it mean~~

Task 6

Operate Bauer horizontal hone machine in automatic cycle . . .

— — — —

Need

Element #2 - Variables/limits -
Emery cloth grits and/or other descriptors
#15 - How many candidate supports &
#24 - Variables/limits -
Honing stone grades & types or other descriptors
#45 - Var./limits - Emery paper size
#47 - How much emery paper grade to be (inches?) DONALD GORDON

COMPANY: Parker Hannifin, Corporation

DEPARTMENT: Tube Preparation

JOB TITLE: Horizontal Hone Operator

TASK: Operate ~~horizontal~~ Barnes horizontal hone machine in automatic cycle to machine production part

TASK NO: 6

CUE: Required to run production; instruction from foreman

TASK ELEMENT	Step	Decision Yes	Decision No	NOTES	VARIABLES/LIMITS
				Finished tube in machine	Master control panel A. "FULL EXPANSION RESET" amber pushbutton light B. "SPINDLE" joystick C "CYCLE" joystick D. "HONE EXPANSION" selector switch E. "SAFETY CLUTCH" voltage meter F. "FINISH CYCLE" white pushbutton light G. "EMERGENCY STOP" pushbutton
1. Is machine started up?		2	62	Visual check "MAIN DISCONNECT" lever on electric panel is in On position and "HYDRAULIC" green light is on when machine is started up	
2. Check sources for emery cloth, honing stones needed for job.	3			Emery cloth used to polish tube Honing stones size tube	Sources for emery cloth, honing stones A. Set up sheet B. Foreman
3. Move "STEADY REST" lever on front of machine to the left or right.	4			Two steady rests move up "STEADY REST" is air type valve	
4. Pull emery cloth out of hone head.	5			Manual Emery cloth is wrapped with one end in hone head	
5. Throw away ~~away~~ emery cloth.	6				

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TASK: Operate horizontal Barnes horizontal hone machine automatic cycle to machine production part

TASK ELEMENT	Step	Decision Yes	Decision No	NOTES	VARIABLES/LIMITS
6. Unhook weight from nylon strap wrapped around tube.	7			Manual Weight & strap used to anchor tube during machine cycle Tube may be called workpiece	
7. Unwrap strap from tube.	8			One end of strap remains attached to machine	
8. Lay unwrapped strap on machine clearing hone oil flow.	9			Suggest strap is placed up & away from workpiece	
9. Lift entry side of tube and slide off collar at entry side.	10			Manual Use chain hoist as work aid in lifting heavier tubes Entry side is left end of tube as operator faces tube from front of machine	Collars A. Entry B. Exit
10. Slide exit end of tube out of exit collar.	11			Manual Use chain hoist as work aid in lifting heavier tubes Exit side is right end of tube as operator faces tube from front of machine	
11. Drain hone oil from tube.	12			Manual Slant tube towards entry end to drain oil Hone oil is coolant Use chain hoist as needed	
12. Put tube in finish rack at machine.	13			Manual Use chain hoist as needed	Tube racks A. Finish rack B. Rough rack

TASK: Operate ~~horizontal~~ Barnes horizontal hone machine automatic cycle to machine production part

TASK ELEMENT	Step	Decision Yes	Decision No	NOTES	VARIABLES/LIMITS
13. Get unmachined tube from rough rack at machine.	14				
14. Slide exit end of tube in exit collar.	15			Manual Use chain hoist as needed	
15. Rest length of tube on intermediate supports.	16			( ) supports	
16. Slide entry collar on entry end of tube.	17			Manual	
17. Slide entry collar to a position allowing it to rest on steady rest post when tube is completely lowered.	18			Manual	
18. Lower tube to completely rest on steady rest post and intermediate supports.	19			Manual Use chain hoist as needed	
19. Wipe oil off tube at stripping point.	20			Use dry rags	
20. Wrap nylon strap around tube.	21			Manual Important: Strap wrapped around tube in direction of tool rotation To wrap strap: From forward position at tube, wrap strap over, around and under tube outside diameter; repeat wrapping motion allowing approximately ¼" of space between bands until strap is fully wrapped around tube with end for weight hanging down at rear side of tube	

TASK: Operate ~~horizontal~~ Barnes horizontal hone machine in automatic cycle to machine production part

TASK ELEMENT	Step	Decision		NOTES	VARIABLES/LIMITS
		Yes	No		
21. Hook weight in strap.	22			Manual	
22. Check visible honing stone in honing tool.	23			Visual check	
23. Is there enough honing stone left to machine tube?		32	24	Visual check	Amount of honing stone needed for machining A. Honing stone thickness measured from steel shell out B. Minimum stone remaining to be .040"
24. Get honing stones needed at tool crib.	25				Honing stone grades Honing stone types
25. Lift up garter spring in steel shell holding honing stone.	26			Manual	
26. Lift out honing stone.	27			Manual	
27. Lift up pig tail spring.	28			Manual	
28. Slide in new honing stone.	29			Stone mounted on holder Slide stone in stone side up Stone has lip at each end	
29. Slip lip of stone under garter ring.	30			Manual	
30. Release garter ring and pig tail spring.	31			Manual	
31. Tap stone in steel shell.	32			Tap lightly with hammer Seats the stone	
32. Push "SPINDLE" joystick on master control panel up to Jog Spindle position and tap repeatedly.	33			Manual Spindle jogs around when joystick is tapped in	"SPINDLE" joystick A. Jog spindle position B. Jog feed position

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TASK: Operate ~~horizontal~~ Barnes horizontal hone machine automatic cycle to machine production part

TASK ELEMENT	Step	Decision		NOTES	VARIABLES/LIMITS
		Yes	No		
				Jog Spindle position Honing stones are jogged around to visible position as spindle is jogged Joystick returns to neutral position when released	~~B. Jog feed position~~
33. Is there enough honing stone left to machine tube?		34	24	Visual check	
34. Are other honing stones to be inspected?		32	35	Any remaining honing stones are to be inspected	Number of honing stones A. 3 to 16 stones B. Number of stones depends on tube size
35. Press "FULL EXPANSION RESET" amber pushbutton light until light goes out.	36			Collapses honing stones to lowest level	
36. Push "SPINDLE" joystick on master control panel up to Jog Spindle position and tap repeatedly.	37			Manual Spindle jogs around exposing honing stone	
37. Tap honing stone again.	38			Tap with hammer Seats stone	
38. Are other honing stones to be seated?		35	39	Any remaining honing stones are to be seated	
39. Move "STEADY REST" lever on front of machine left or right.	40			Steady rests will move down "STEADY REST" is air type valve	
40. Press "INCH" pushbutton on remote pushbutton panel repeatedly until distance between honing tool and entry end of tube is about ½".	41			"INCH" pushbutton moves carriage forward	

TASK: Operate ~~horizontal~~ Barnes horizontal hone machine (cw) automatic cycle to machine production part

TASK ELEMENT	Step	Decision		NOTES	VARIABLES/LIMITS
		Yes	No		
41. Lift honing tool while pressing "INCH" pushbutton on master control panel repeatedly manuevering honing tool into entry end of tube.	42			Manually Use pry bar to lift heavy tools Inch very carefully "INCH" pushbutton moves carriage forward Honing tool floats enough to be manuevered into tube Leading edge of tool goes into tube	
42. Push "CYCLE" joystick on master control panel up to Start Cycle position.	43			Machine cycle begins Tube is sized	
43. Wait for machine to complete sizing cycle watching for lighting of "FULL EXPANSION RESET" amber light.	44			Stroking is automatic Honing tool withdraws automatically when sizing is completed	Sizing cycle time A. 10 minutes out of 15 minute total tube machining time B. 90 minutes out of 120 minute tube machining time
44. Did "FULL EXPANSION RESET" amber pushbutton light come on?		21	45	Honing stone (s) needs to be checked, possibly changed if light does (cw)	
45. Cut or tear emery paper to size needed.	46			Emery paper at machine Emery paper used to polish tube	Emery paper size needed A. Length B. Width
46. Roll emery paper to tube shape.	47			Tube shape describes configuration of paper when rolled	
47. Put one end of rolled emery paper in entry end of tube.	48			(inches) to be in tube	
48. Press "INCH" pushbutton on remote control panel repeatedly while manuvering hone head into emery paper.	49			Manual Carriage moves forward when "INCH" pushbutton is pressed	

TASK: Operate ~~horizontal~~ Barnes horizontal hone machine automatic cycle to machine production part

TASK ELEMENT	Step	Decision Yes	Decision No	NOTES	VARIABLES/LIMITS
				Honing tool flexible enough to be raised or lowered & moved from one side to the other	
49. Continue manuevering and inching until all honing stones are covered by emery paper.	50			Manual manuevering Visual check for covering of honing stones	
50. Hold emery paper and press "INCH" pushbutton on remote control panel until honing stone surfaces are completely covered	51			Two inches of emery paper will be left extended at end of honing tool when stones are covered	
51. Turn "HONE EXPANSION" selector switch clockwise to Off position.	52				"HONE EXPANSION" selector switch A. Off position B. Auto position
52. Wait for "SAFETY CLUTCH" voltage meter on master control panel to reach 100 volts.	53			Visual check 2 second wait	"SAFETY CLUTCH" voltage meter A. 0 - 100 volt readings
53. Press "FINISH CYCLE" white pushbutton light on master control panel at same time turning "HONE EXPANSION" selector switch on master control panel counter-clockwise to Auto position.	54				
54. Push "SPINDLE" joystick up to Jog Spindle position twice.	55				
55. Did emery paper stay in position?		56	45	Emery paper needs replacement	
56. Push "SPINDLE" joystick on master control panel up to Jog Feed position at same time pushing "CYCLE" joystick on master control panel up to Start Cycle position.	57			Tube is polished	Polishing cycle time A. 5 minutes out of 15 minute total tube machining time B. 30 minutes out of 120 minute total tube machining time

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TASK: Operate ~~horizontal~~ Barnes horizontal hone machine in automatic cycle to machine production part

TASK ELEMENT	Step	Decision		NOTES	VARIABLES/LIMITS
		Yes	No		
57. Wait for machine to finish polishing part of cycle.	58				
58. Release "SPINDLE" and "CYCLE" joysticks on master control panel.	59			Both joysticks go to neutral position when released	
59. Are other tubes to be machined?		3	60	Operator checks rough rack for presence of tubes	
60. Is machine to be shut down?		61	EOT		
61. Press "EMERGENCY STOP" pushbutton on master control panel.	EOT			Turns off electric and hydraulic power	Conditions for machine shut down A. End of shift B. End of work day C. Instruction from foreman
62. Start up machine.	3			See task: "Start up horizontal hone machine"	

Appendix B-22.

PRECISION-MASTERS, INC.

15 U LATHE OPERATOR

1. Start up 15 U Lathe
2. Shut down 15 U Lathe
3. Temporarily add, change or delete commands in a "PPS" block on 15 U Lathe
4. Edit "PPS" block of data on 15 U Lathe
5. Execute "PPS" block (s) of data on 15 U Lathe
6. Modify tool memory offsets on 15 U Lathe
7. Modify active offsets in automatic mode on 15 U Lathe
8. Modify active offsets in manual mode on 15 U Lathe
9. Set "H" codes on 15 U Lathe
10. Activate a tool memory offset on 15 U Lathe
11. Enter tool memory offset length (s) on 15 U Lathe using auto-set method
12. Machine reference the Z axis on 15 U Lathe
13. Clear tool memory of length (s) and radius (radii) on 15 U Lathe
14. Clear "PPS" programs from memory on 15 U Lathe
15. Display tool memory offsets on "CRT SCREEN" on 15 U Lathe
16. Search "PPS" program numbers on 15 U Lathe
17. Set up threading tooling on 15 U Lathe
18. Set up boring bar on 15 U Lathe

PRECISION-MASTERS, INC.

10 VFS MILL TASKS

1. Start up 10 VFS Mill
2. Shut down 10 VFS Mill retaining computer program
3. Temporarily add, change or delete commands in a "PPS" block on 10 VFS Mill
4. Edit "PPS" block of data on 10 VFS Mill
5. Execute "PPS" block (s) of data on 10 VFS Mill
6. Modify tool memory offsets on 10 VFS Mill
7. Set "H" codes on 10 VFS Mill
8. Activate a tool memory offset on 10 VFS Mill
9. Machine reference the Z axis on 10 VFS Mill
10. Clear "PPS" programs from memory on 10 VFS Mill
11. Display tool memory offsets on "CRT SCREEN" on 10 VFS Mill
12. Search "PPS" program numbers on 10 VFS Mill
13. Clear tool memory of length (s) and radius (radii) on 10 VFS Mill
14. Set up drill or reamer tooling on 10 VFS Mill
15. Set up carbide mill (cutter) on 10 VFS Mill
16. Set up boring bar on 10 VFS Mill
17. Set up end mill on 10 VFS Mill
18. Set up tap tooling on 10 VFS Mill
19. Part reference the "X" and/or "Y" axis on the 10 VFS Mill
20. Reference the tool matrix on 10 VFS Mill

PRECISION-MASTERS, INC.

15 V MILL TASKS

1. Start up 15 V Mill
2. Shut down 15 V Mill retaining computer program
3. Temporarily add, change or delete commands in a "PPS" block on 15 V Mill
4. Edit "PPS" block of data on 15 V Mill
5. Execute "PPS" block (s) of data on 15 V Mill
6. Modify tool memory offsets on 15 V Mill
7. Set "H" codes on 15 V Mill
8. Activate a tool memory offset on 15 V Mill
9. Machine reference the Z axis on 15 V Mill
10. Clear "PPS" programs from memory on 15 V Mill
11. Display tool memory offsets on "CRT SCREEN" on 15 V Mill
12. Search "PPS" program numbers on 15 V Mill
13. Clear tool memory of length (s) and radius (radii) on 15 V Mill
14. Set-up drill or reamer tooling on 15 V Mill
15. Set-up carbide mill (cutter) on 15 V Mill
16. Set-up boring bar on 15 V Mill
17. Set-up end mill on 15 V Mill
18. Set-up tap tooling on 15 V Mill

COMPANY: Precision-Masters, Inc.

DEPARTMENT: CNC Machining

JOB TITLE: 15 V Mill Operator

TASK: Edit "PPS" block of data on 15 V Mill

TASK NO: 4

CUE: Instruction from supervisor or programmer

TASK ELEMENT	Step	Decision		NOTES	VARIABLES/LIMITS
		Yes	No		
				Mill is turned on	
					Control panel A. "AUTO" pushbutton B. "OFF/EDIT/PUNCH/LOAD" selector switch C. "CRT" selector switch D. "INHIBIT/ALLOW" selector switch E. "KEYBOARD" pushbutton F. "PPS SEARCH" pushbutton G. Keyboard "NUMERIC" section H. "MODIFY BLOCK" pushbutton
1. Press "AUTO" pushbutton on control panel.	2			Allows operation in automatic mode Press until lit	
2. Turn "OFF/EDIT/PUNCH/LOAD" selector switch on control panel to "EDIT" position.	3				"OFF/EDIT/PUNCH/LOAD" selector switch A. "EDIT" position B. "OFF" position
3. Turn "CRT" selector switch on control panel to "BUFFER" position.	4			Shows display of information in buffer register	

TASK: Edit "PPS" block of data on 15 V Mill

TASK ELEMENT	Step	Decision		NOTES	VARIABLES/LIMITS
		Yes	No		
4. Turn the "INHIBIT/ALLOW" selector switch on control panel to "ALLOW" position.	5			Key operated switch	"INHIBIT/ALLOW" selector switch A. "ALLOW" pushbutton B. "INHIBIT" pushbutton
5. Press "KEYBOARD" pushbutton on control panel.	6			Activates keyboard section Press until lit	
6. Enter block number to be edited on keyboard "NUMERIC" section of control panel.	7				Keyboard "NUMERIC" section A. Pushbuttons for numbers 0 thru 9 B. Pushbutton for "PLUS/MINUS" (±) C. Pushbutton for "DECIMAL" (.) Sources for block numbers, block decisions, edit functions, change values, editing decisions address codes, add data, delete data, coordinate codes A. Program readout B. Program set-up sheet C. Programmer Block number range A. 0001 thru 9999
7. Press "PPS SEARCH" pushbutton on control panel.	8			Searches program to block number entered and stops Opens located block for editing "PPS" is abbreviation for Parts Program Storage	

TASK: Edit "PPS" block of data on 15 V Mill

TASK ELEMENT	Step	Decision		NOTES	VARIABLES/LIMITS
		Yes	No		
8. Read display on "CRT SCREEN" on control panel.	9			Data for block number selected appears on "CRT SCREEN"	
9. Is the block displayed the block to be edited?		10	6	If the wrong block, incorrect block number was entered	
10. Is value of existing data to be changed?		11	16		Types of editing A. Adding data B. Deleting data C. Changing value of existing data
11. Check sources for the value change.	12				
12. Enter the value change on keyboard "NUMERIC" section of control panel.	13			If minus value, press "PLUS/MINUS" pushbutton on keyboard "NUMERIC" section Plus value is assumed First push completes editing Second push causes display on "CRT SCREEN" "KEYBOARD" light goes out	
13. Enter address code on keyboard "ALPHA" section of control panel.	14				
14. Press "MODIFY BLOCK" pushbutton on control panel twice.	15				

TASK: Edit "PPS" block of data on 15 V Mill

TASK ELEMENT	Step	Decision		NOTES	VARIABLES/LIMITS
		Yes	No		
15. Was value change made?		16	5	Read "CRT SCREEN" to verify value change	
16. Is data to be added?		17	22		Types of data that can be added A. Coordinate B. Miscellaneous C. Offset D. Tool change number
17. Press "KEYBOARD" pushbutton on control panel.	18				
18. Enter value of data to be added on keyboard "NUMERIC" section of control panel.	19			If a minus value, press "PLUS/MINUS" pushbutton on keyboard "NUMERIC" section Plus value is assumed	
19. Press pushbuttons for address codes on keyboard "ALPHA" section of control panel.	20				Keyboard "ALPHA" section A. Pushbuttons for letters A thru Z
20. Press "MODIFY BLOCK" pushbutton on control panel twice.	21			First push completes editing Second push causes display on "CRT SCREEN" "KEYBOARD" light goes out	
21. Was data added?		22	17	Read "CRT SCREEN" for presence of added data	

TASK: Edit "PPS" block of data on 15 V Mill

TASK ELEMENT	Step	Decision		NOTES	VARIABLES/LIMITS
		Yes	No		
22. Is data to be deleted?		23	27		
23. Press "KEYBOARD" pushbutton on control panel.	24			Activates keyboard Press until lit	
24. Enter address code of data to be deleted on keyboard "ALPHA" section of control panel.	25				
25. Press "MODIFY BLOCK" pushbutton on control panel twice.	26			First push completes editing Second push causes display on "CRT SCREEN"	
26. Was coordinate data deleted?		27	23	Read "CRT SCREEN" to verify deletion of coordinate code	
27. Is other data to be added, coordinate codes deleted or change values made?		5	28		
28. Turn "OFF/EDIT/PUNCH/LOAD" selector switch on control panel to "OFF" position.	29				
29. Turn "INHIBIT/ALLOW" selector switch on control panel to "INHIBIT" position.	EOT			Key operated switch	

Appendix B-24.

REGAL RUGS, FORM 111

TASK LIST

HAND GUN OPERATOR & SHEAR/CARVE OPERATOR

Hand Gun Operator

1. Set up hand tufted rug primary backing by framing
2. Thread yarn in tufting hand gun
3. Maintain tufting hand gun on daily basis
4. Tuft hand tufted rug
5. Trim, remove or insert tufts
6. Inspect hand tufted rug
7. Complete routine housekeeping in hooking area

Shear/Carve Operator

1. Hem "MONK'S CLOTH" for hand tufted rug
2. Shear hand tufted rug to specifications
3. Trim out splices of hand tufted rug
4. Carve hand tufted rug
5. Complete final inspection and repair of hand tufted rug
6. Prepare hand tufted rug for shipping
7. Maintain Shearmaster equipment
8. Maintain Techmatic equipment
9. Complete routine housekeeping in shear area

COMPANY: Regal Rugs, Inc.

DEPARTMENT: Form 111

JOB TITLE: Hand Gun Operator

TASK: Tuft hand tufted rug

TASK NO: 4

CUE: Instruction from supervsior

TASK ELEMENT	Step	Decision		NOTES	VARIABLES/LIMITS
		Yes	No		
1. Check sources to determine specifications for yarn (s) to be used.	2				Sources for yarn decision, number of ends, tuft length, stitching rate per inch, gauge type of pile A. Work order B. Pattern rendering C. Rug sample D. Supervisor Yarn specifications A. Color number B. Color description C. Yarn poms D. Yarn count E. Yarn ply F. Eveness of color G. Absence of soil and grease
2. Does rug require more than one color?		3	4		
3. Decide which color to tuft.	4			Operator's choice	
4. Obtain yarn from yarn storage area.	5				

TASK: Tuft hand tufted rug

TASK ELEMENT	Step	Decision		NOTES	VARIABLES/LIMITS
		Yes	No		
5. Obtain tufting gun from supervisor.	6			Gun chosen by supervisor	
6. Check sources for number of ends.	7				Number of ends range A. 1 thru 3
7. Does yarn color and construction on work order match pattern rendering?		8	42	Construction refers to count and ply Count=thickness of each ply Ply=number of strands per ply	
8. Put yarn cone on cone holder.	9			Yarn cone slides on cone holder narrow end up	
9. Does gun need oiling?		10	11	Visual check	Criteria for oiling decision A. Gun has dry appearance B. Gun is hot
10. Oil gun.	11			Follow TAG #3 for Hand Gun Operator	
11. Hang gun in counter balance carrier.	12				
12. Is weight of gun balanced by counter balance weight?		13	43	If balanced, gun will float and pull down and forward easily from suspended position	
13. Thread yarn to gun.	14			Follow TAG #2 for Hand Gun Operator	

TASK: Tuft hand tufted rug

TASK ELEMENT	Step	Decision		NOTES	VARIABLES/LIMITS
		Yes	No		
14. Thread yarn in gun.	15			Follow TAG #2 for Hand Gun Operator	
15. Plug in gun.	16				
16. Check work order for stitching speed.	17			Stitching speed is speed at which tufts are inserted Speed determines number of tufts (stitches) per inch	
17. Stitch sample on excess cloth.	18				
18. Is number of stitches per inch correct?		22	19		
19. Adjust movement of gun.	20				Stitch rate A. Controlled by angle of gun B. Controlled by pressure on gun C. Controlled by speed of forward movement of gun D. Controlled by line pressure
20. Stitch sample.	21				
21. Is number of stitches per inch correct?		22	45		
22. Check sources for tuft length.	23				

TASK: Tuft hand tufted rug

TASK ELEMENT	Step	Decision		NOTES	VARIABLES/LIMITS
		Yes	No		
23. Measure tuft length of sample stitching.	24			Use ruler	Tuft length range, pile height A. One to two inches
24. Is tuft length correct?		26	25		
25. Adjust length by turning adjusting screw on gun.	26			Use allen wrench size: 1/8"	Tuft length adjusting screw A. Eight settings B. Tuft length range: 1 thru 2 inches
26. Is this a cut pile rug?		46	27		Pile types A. Cut B. Loop
27. Does more than one area require this color?		28	29	If not, total rug is done in this color	
28. Find the area of rug with finest detail.	29				
29. Decide direction of first row of stitches.	30				Stitching directions A. Clockwise B. Counter-clockwise C. Stitch straight lines in a straight line D. Left to right E. Right to left F. Work towards center

TASK: Tuft hand tufted rug

TASK ELEMENT	Step	Decision		NOTES	VARIABLES/LIMITS
		Yes	No		
30. Tuft first row of stitches beginning at outside border of area moving towards center of area.	31				
31. Determine sequence of stitching needed to complete area.	32			Operator's choice Sequence means path of stitching Stops show up on finished product	Sequence criteria A. Sequence should yield least number of stops possible B. Sequence should yield maximum efficiency
32. Check sources for gauge required.	33			Gauge=number of rows per inch	
33. Tuft second row of stitches.	34				
34. Measure gauge.	35			Use ruler to measure and determine distance needed between rows to achieve gauge	Gauge range A. Two to four rows of stitches
35. Is gauge correct?		36	47		
36. Continue tufting until area is filled in.	37				
37. Is texture correct?		38	42		Correct texture criteria A. Pile height fairly even B. Density is uniform
38. Is pile height correct?		39	42	Check with ruler	

TASK: Tuft hand tufted rug

TASK ELEMENT	Step	Decision		NOTES	VARIABLES/LIMITS
		Yes	No		
39. Is color uniform?		40	42	Visual check	
40. Tuft other areas requiring this color.	42				
41. Are there other colors to be tufted?		3	EOT		
42. See supervisor.	EOT				
43. Obtain counter-balance weight which balances gun.	44				Counter-balance weights A. 6 thru 10 lbs.
44. Place weight on holder.	13				
45. Adjust air pressure to gun at line regulator.	22				Air pressure A. Increased pressure increases stitches per inch B. Maximum 80 lbs. pressure
46. Is yarn being cut properly?		27	48		
47. Adjust spacing of rows to achieve gauge.	36				
48. Sharpen knife.	27				

Appendix B-26

March 26th, 1982

EVALUATION of WAVETEK INDIANA ASSEMBLY TRAINING PROGRAM

Introduction

This report is based on twenty hours of observation and involvement with the new employee assembly training school the week of March 15th, 1982. This training class met Monday through Friday from 7.00 A.M. to 3:30 P.M. Thirty-one new Wavetek employees participated. Mr. Don Hoots, a general foreman for Wavetek, performed the responsibilities of a training director with assistance from other Wavetek employees who for the purpose of this class served as instructors and inspectors. Those seven assistants were experienced production personnel. The class met at Wavetek's old facility on First Avenue about two miles from the new plant.

The training program has a number of objectives including the following:

1. To provide new employees with an orientation to Wavetek Indiana, Inc.
2. To help new employees develop good work habits and attitudes.
3. To begin to develop the basic skills required to do manufacturing tasks on the production floor.
4. To evaluate new employee performance.
5. To make recommendations as to the initial placement of new employees on the production floor.

As indicated, this is a training, evaluation and placement program.

Observations

1. The production program appears to be content valid - Work materials from the production areas are used. Employees are taught to perform the work tasks

required during the manufacturing process. Evaluation of the work performed is in line with the evaluation and inspection criteria used in the plant. Although some latitude is allowed, this seems appropriate considering the purposes of the program.

2. The attitude and work habits training appears to be content valid - Expectations in both areas appear to be in line with expectations in the plant or at least the performance objectives are the same.

3. The staff to student (new employee) ratio was more than adequate - Note that there were seven instructors and one training supervisor (equivalent to director) for the thirty-one students. An experienced inspector although not directly involved in instruction of students provided a crucial part of the training effort. The inspector was one of the two lead instructors.

4. The choice of staff had the proper objectives - The staff chosen as instructors were experienced personnel who function as group leaders in the plant. This training program helps these employees develop their training and leadership skills as they assist the new employees. Most demonstrated average skills for their position and a couple demonstrated excellent skills although there was room for refinement. The majority demonstrated enthusiasm and sincerity.

5. The approach to the students had the right objectives - Students were given much positive reinforcement. In fact this was the primary thrust. In a situation where many mistakes are made which can lead to considerable frustration, this positive approach did much to help the students relax, concentrate and learn.

6. The instruction method had some good points - An attempt was made to use audio-visual aides to instruction in the form of film strips and transparencies. Although the application of audio-visual techniques was limited, some assistance to learning and some variety in instruction were end products. Step by step instruction was provided during part of the training. This helped to both organize the

instruction and simplify the completion of tasks. Practice time was also allowed.

7. The training program effort is a major and positive step in the preparation of new employees - The effort made to prepare new employees for work prior to placement on jobs is in general commendable. The advantage of such training taking place in a formal, structured and deliberate manner and separated from production and other pressures, are numerous. And in this case, some of the realities of the world of work were preserved. A major consideration is the fact that the training program was content valid in that the students were being taught only the skills, concepts, attitudes and work habits pre-requisite to their being successful employees of Wavetek. Obviously, some of the learning would be appropriate to any work setting. However, the important point is that the learning is designed to be specific to Wavetek's requirements. This at first glance would appear to be the most obvious approach for any company to use. However, much training tends to be generalized rather than work task specific and specific to a work site and is usually informal, unstructured, and lacking well defined performance objectives. Wavetek has tried to avoid these errors.

Suggestions for Change

1. The work samples - The materials used and assembly requirements represent the work done in the plant. However, they should be more carefully evaluated to assess the skills and knowledge required for satisfactorily completion of work. Such factors as eye-hand coordination, lateral and bi-lateral movements, dexterity, visual acuity, depth perception, total as compared to specific images, logical sequencing of activity, color awareness, plus other factors, all affect the level of difficulty for a given work task. Training should move from the simple to the more complex tasks. An attempt was made to train in this manner but the heirarchy of tasks showed some problem areas.

2. The instruction -

A. The instruction needs to be clearer, more concise, more specific and always consistant from one instructor to another. When the total class is being addressed,

one person only should provide the information without corrections, additions and/or deletions being added by others especially with more than one person talking at the same time (yelling out, etc.). This is primarily important when a task is being taught.

B. All tasks should be taught step by step - This was done rather well for some tasks but not for others. It should not be assumed that the learner will recall or transfer learning from one task to another. Therefore, all steps need to be taught for every task. The instructors often forget to relate steps which are almost automatic for them. The learner has to learn everything. With experience, learning will transfer but this may take days, weeks or even months of practice.

C. Better limits need to be specified for the information being taught and which the student must learn. The instructor made a solid attempt to be specific but extraneous and unnecessary information got into the instruction. For the purpose of efficiency in training, ease of learning and fewer distractions, this unnecessary information should be eliminated. The variables involved in the completion of a task step should be made more clear to the students. Variables not directly applicable to the task at hand should not be mentioned.

D. An open entry - open exit system could be used which allows students to progress at their own speed. This would necessitate elimination of the large group instruction method used during part of the training. This large group approach seemed to create many problems not the least of which was that some students were several steps behind the instructor at the front of the room. Additional instructions were given by the instructors for the sub-groups and possibly by other instructors. There were too many instructions, differing instructions and I am sure some confusion. More individualized instruction from the beginning with students learning at their own individual rates, completing the training at their own rates and leaving the program accordingly, would be a better approach. Among other things, this approach leads to students receiving positive reinforcement automatically, students are less frustrated, and the training is more cost-effective.

E. Audio-visual equipment should be upgraded representing something closer to the state of the art. Sound on slide and video-tape presentations would add much to instruction. Staff need to be trained to use A-V equipment more effectively.

F. Scope training suffered because of its location. There was usually too much activity surrounding the learner (people, voices, food, coffee, supplies, clutter) which I feel made the learner's task, and the trainer's, much harder especially considering the level of difficulty for scope work and the high level of concentration required. The students and trainer are to be applauded for their endurance.

3. The physical environment - Besides the problem in the scope area, the room for the rest of the training had some deficiencies. Needed: More adequate lighting which does not cast shadows or cause glare, more space especially between rows of tables, more storage area for supplies and equipment, a better public address system, environmental controls for temperature, dampness, etc.

4. Preparedness - All staff need to be better prepared in terms of the instructions they give, training content, supplies and other items required for the program. Time is possibly a factor causing inadequate preparation. I did not see any serious problem. However, running out of supplies confused some students, delayed instruction for some and required trips to the new plant.

5. Specific criteria for evaluation and placement - With the exception of quantity of work produced, most criteria are too general. The quantity item itself could use a better breakdown. For instance, rather than the number of P-C boards completed, use number of transistors, wires, welds, errors completed or made in a given period of time. Similar details could be spelled out for other evaluation items. The inspection, evaluation and quality control standards used are in line with plant requirements designed by experts. However, in the training situation and especially when staff are being used who are themselves learners, quantifiable, objective data become very important. Errors in judgement can be eliminated or at least communication is easier and more effective.

6. An optional plus - An added touch of refinement would be to do some screening on the first day leading to sub-grouping of students by ability level. This would make instruction more appropriate for a given group and should facilitate learning.

Conclusion

The assembly training school program represents an excellent attempt by Wavetek to train new employees. Its outstanding characteristics are its positive direction towards content validity, towards company/task specific training, and towards using performance based criteria. However, the program is in need of organization, considerable refinement, and in general professionalization. The program is staffed by persons who are non-professionals in that they are not well trained to provide training, evaluation and placement services. This fact is reflected throughout the program and certainly accounts for some of the program deficiencies. However, I must mention again the high level of dedication, sensitivity and responsiveness to the students demonstrated by the staff. This too is reflected in the program. There is also an awareness, although limited, of the problem areas by the staff. Some of the items in this report were called to my attention by them. Mr. Hoots, the training supervisor, was especially astute and able to articulate some of the problem areas.

Upgrading of the program will undoubtedly require professional assistance. Upgrading is needed in all training areas. Of key importance is the task content and content limits. Most of the staff seem to be receptive to change and are anxious to do the best job possible. I believe that the TfP method would upgrade all areas and resolve problems. With some professional assistance (the time involved would not be too great), this Wavetek program could become a model training program. Most of the basic components are in place.

Don Gordon, Work Analysis Specialist

XI. FINAL REPORT ABSTRACT

The Process/Products of this Project were:

1. The provision of a work analysis and training service to industry
2. The enhancement of the New Castle Area Vocational School PBVE curriculum
3. A demonstration of the benefits of having a work analysis specialist

The Specific Objectives of the Project were:

1. Continue to train a work analysis specialist
2. Complete four training programs from the 1980-81 Work Analysis Specialist Project
3. Complete three additional training programs (local or state designated companies) based on the specific needs of the business or industry

The Procedures for Achieving the Objectives were:

Objective #1: Continue to train a work analysis specialist

A. Specialist was hired
B. Specialist received training in the use of the TfP method
C. Specialist attended meetings and conferences as part of training

Objective #2: Complete four training programs

A. Data collection was completed and assembled
B. Training priorities were established
C. Workers were selected to participate in training
D. Instructors were hired
E. Pre-testing of workers was completed
F. Training programs were provided
G. Trainee performance was evaluated
H. Certificates of completion were presented to trainees at a special commencement luncheon

Objective #3: Complete three additional training programs

A. Data collection was completed and assembled
B. Training priorities were established
C. Workers were selected for training
D. Instructors were hired
E. Pre-testing of workers was completed
F. Training programs were provided

G. Trainee performance was evaluated

H. Certificates of completion were presented

The Outcome for Vocational Education was:

1. Work analysis services were provided to four Henry County companies and eight out of county companies. Four of the out of county companies were setting up new operations in Indiana. Four training programs were provided directly by the project. Two companies provided their own training using the training manuals developed by the project. "Quality Circles" and "GED" training also resulted in part due to project involvement. These project activities made a contribution to the companies involved and to the economic development effort in Indiana.

2. The NCAVS PBVE curriculum was enhanced through sharing information developed by the project (including company work content as permitted by companies), sharing changes made in the application of performance based principles to industry training, and through sharing contacts with business and industry.

3. The value of having a work analysis specialist was demonstrated to the local community and to the state. The position of the specialist and the work of the project were well received as indicated by the number of companies involved with the project.

4. Some good public relations were established through the projects' participation in the NCAVS community resource survey.